A DISSERTATION ON

"CLINICAL STUDY ON MANAGEMENT OF INCISIONAL HERNIA AND ITS OUTCOME"

Dissertation submitted to

THE TAMIL NADU Dr.M.G.R.MEDICAL UNIVERISTY

CHENNAI

with partial fulfillment of the regulations

for the Award of the degree

M.S. (General Surgery)

Branch –I

INSTITUTE OF GENERAL SURGERY,

MADRAS MEDICAL COLLEGE,

CHENNAI.

APRIL - 2017

CERTIFICATE

This is to certify that the dissertation entitled "**CLINICAL STUDY ON MANAGEMENT OF INCISIONAL HERNIA AND ITS OUTCOME**" is a bonafide original work of **Dr. A.ARUL KUMAR,** in partial fulfillment of the requirements for M.S.Branch–I (General Surgery) Examination of the Tamil Nadu Dr. M.G.R.Medical University to be held in APRIL 2017 under my guidance and supervision in 2015-16.

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Guide and supervisor
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Chennai - 600003

Dr. MK. MURALITHARAN M.S, M.Ch,
Dean Madras Medical College & Rajiv Gandhi Government
General Hospital, Chennai-600003.

DECLARATION

I hereby solemnly declare that the dissertation titled "**CLINICAL STUDY ON MANAGEMENT OF INCISIONAL HERNIA AND ITS OUTCOME**" is done by me at Madras Medical College & Rajiv Gandhi Govt. General Hospital, Chennai during 2015-16 under the guidance and supervision of Prof. Dr. R. A. PANDYARAJ, M.S, FRCS. The dissertation is submitted to The Tamil Nadu Dr. M.G.R. Medical University, Chennai towards the partial fulfillment of requirements for the award of M.S. Degree (Branch-I) in General Surgery.

Place:
Date:

DR.A. ARUL KUMAR,
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CERTIFICATE OF APPROVAL

To
Dr.A.Arul Kumar
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Chennai 600 003

Dear Dr.A.Arul Kumar,

The Institutional Ethics Committee has considered your request and approved your study titled **"CLINICAL STUDY ON MANAGEMENT OF INCISIONAL HERNIA AND ITS OUTCOME " - NO.12022016.**

The following members of Ethics Committee were present in the meeting hold on **02.02.2016** conducted at Madras Medical College, Chennai 3

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2.Dr.R.Vimala,MD.,Dean,MMC,Ch-3	:Deputy Chairperson
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10.Tmt.J.Rajalakshmi, JAO,MMC, Ch-3	: Lay Person
11.Thiru S.Govindasamy, BA.,BL,High Court,Chennai	: Lawyer
12.Tmt.Arnold Saulina, MA.,MSW.,	:Social Scientist

We approve the proposal to be conducted in its presented form.

The Institutional Ethics Committee expects to be informed about the progress of the study and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.

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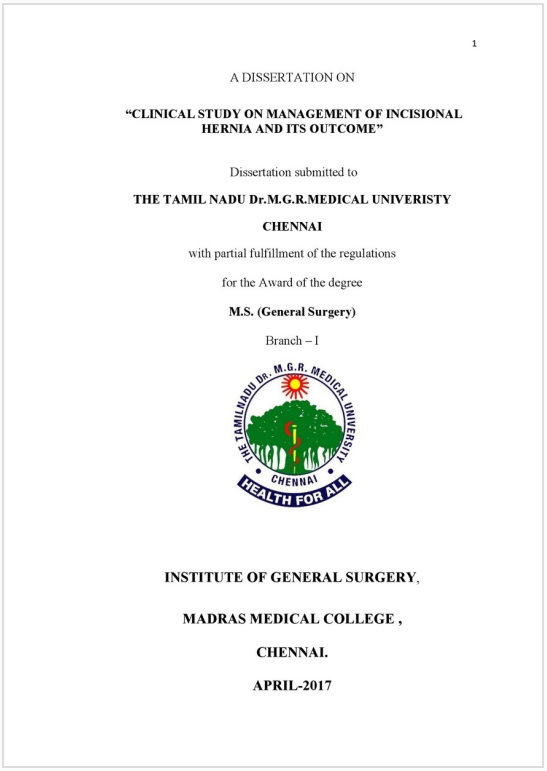

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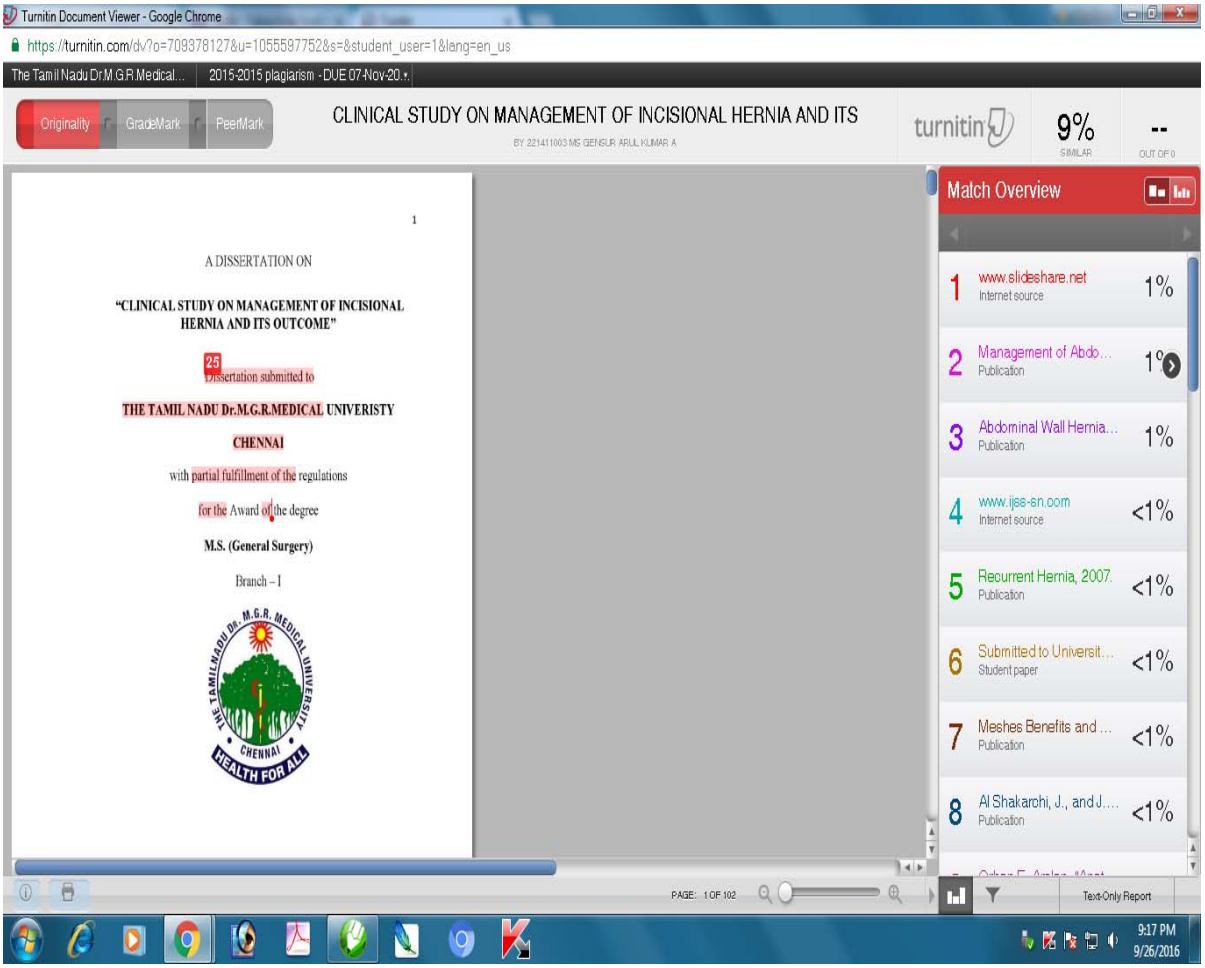
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I am very grateful to **Prof. Dr. R. A. PANDYA RAJ** M.S, **FRCS** Professor of Surgery, Institute of General Surgery, and my Assistant Professors **Dr.R.MANIVANNAN M.S, Dr.J.SELVARAJ M.S, Dr.D.MANIVANNAN M.S, Dr.D.VINODH M.S and Dr.G.VIMALA M.S, DGO,** Madras Medical College & Rajiv Gandhi Government General Hospital who guided and trimmed my work throughout the period of my study.

I am extremely thankful to all the Members of the INSTITUTIONAL ETHICAL COMMITTEE for giving approval for my study. I also thank all the patients who were part of the study and my Professional colleagues for their support and criticisms.

With deep reverence, I salute my parents **Mr. V. ANGAMUTHU** and **Mrs. A. VALARMATHI**. I also thank my life companion **Dr. M. SHAILAJA** for her immense support. I thank the almighty for blessing me with a wonderful family, to whom I dedicate this thesis and leave unsaid what they mean to me.

CONTENTS

ABSTRACT

BACKGROUND:

Incisional hernia of the anterior abdominal wall is more common after any major abdominal surgery. Mesh repair can be onlay, sublay / pre-peritoneal and laparoscopic. All these types of meshplasty have their own merits and demerits, due to differences in the method of surgical technique, time of surgery, post operative complications and the rate of recurrence.

AIMS & OBJECTIVES:

1) To study the risk factors of incisional hernia**.**
2) To study various surgical techniques with emphasis on Onlay, Preperitoneal and Laparoscopic intra-peritoneal mesh repair
3) Post operative outcomes.

MATERIALS AND METHODS:

50 patients presented with incisional hernia were admitted to Rajiv Gandhi Government General Hospital, Institute of General Surgery, Madras Medical College, Chennai from August 2015 to August 2016 and were assessed preoperatively both clinically and ultrasonographically to confirm the diagnosis. Patients satisfying both inclusion and exclusion criteria was selected. Onlay mesh repair was done in 18 patients, preperitoneal mesh repair was done in 16 patients and laparoscopic mesh repair was done in 16 patients after obtaining detailed informed written consent.

RESULTS:

Post operative results were tabulated and analysed by appropriate statistical method. Seroma formation, wound infection and chronic pain were seen in 33.33%, 22.22%, 22.22% patients respectively, in onlay mesh repair group, 18.75%, 12.5%, and 18.75% patients respectively, in sublay / pre-peritoneal mesh repair group and 12.5%, 0%, 12.5% patients, respectively, in laparoscopic group. Mean drainage time was 5.88 days, 4.25 days for onlay and preperitoneal group respectively. Length of hospital stay was 9.61 days, 7.38 days, 4.94 days foe onlay, preperitoneal and laparoscopic group respectively. No short term recurrences (3 months) was seen in any of the study group.

CONCLUSION:

Seroma formation and wound infection rate were low in laparoscopic mesh repair group when compared to onlay mesh repair and pre-peritoneal mesh repair group. Incidence of chronic pain more in onlay mesh repair group than preperitoneal and laparoscopic mesh repair group. Length of hospital stay is shorter following laparoscopic and preperitoneal mesh repair compared to onlay group. There was no recurrences observed due short duration of follow up. On observing these post operative status of various repair, we suggest that laparoscopic intraperitoneal mesh repair was superior to onlay and preperitoneal mesh repair.

KEYWORDS: Incisional Hernia, mesh repair,onlay, preperitoneal, laparoscopic, complications.

ABBREVIATIONS

AR	- Anatomical Repair
BMI	- Body mass index
COPD	- Chronic Obstructive Pulmonary Disease.
CVS	- Cardio Vascular System.
CxR	- Chest X-Ray.
DM	- Diabetes Mellitus.
DT	- Drainage Time
DU	- Duodenal Ulcer
DVT	- Deep Vein Thrombosis.
ECG	- Electro Cardiogram.
FBS	- Fasting Blood Sugar.
GIT	- GastrointestinalTract
Hb	- Haemoglobin.
HTN	- Hypertension
LAP IPM	- Laparoscopic Intraperitoneal Mesh Repair
LSCS	- Lower Segment Caesaerian Section
MR	- Mesh Repair
PTFE	- Poly Tetra Fluoro Ethylene.
PS	- Puerperal Sterilisation
RBS	- Random Blood Sugar.
SL : WL	- Suture Length to Wound Length.
SPT	- Suprapubic transverse

INTRODUCTION

INTRODUCTION

Incisional hernia is an important complication of any abdominal surgery, where its incidence is still high in spite of modern techniques. It is the one true iatrogenic hernia. Ian aird defined incisional hernia as a diffuse extrusion of peritoneum and contents of abdominal cavity through a weak scar of an operation or accidental wound. Incidence of incisional hernia is about 2-11% of patients subjected to abdominal operations. Many factors are associated with incisional hernia like age, sex, obesity, comorbidities like diabetes, chest infections, type of suture material used and most importantly wound infection, which is a challenging problem to the surgeon.

Incisional hernia usually starts within months after surgery and if left unattended they attain large size and lead to complications like discomfort, incarceration, skinnecrosis, obstruction and even strangulation adding further morbidity and in some cases mortality to the patient.

With advent of modern anesthesia, antiseptic precautions, higher antibiotics and greater understanding of surgical anatomy and newer surgical techniques viz. Onlay, sublay, component separation method, retrorectus repair, laparoscopic mesh repair ; the incidence of recurrence rates, morbidity and mortality were reduced.

This study has been undertaken to study various risk factors of incisional hernia and study on short term outcome various surgical techniques viz. Onlay, preperitoneal /sublay and laparoscopic mesh repair.

AIMS AND OBJECTIVES

AIMS AND OBJECTIVES

It was noted that incisional hernia is a common sequelae following any major abdominal operations since its inception. Inspite various techniques, recurrences are still at higher rate and to reduce post op complication is still a challenge to the surgeon. The aim of this study is

1) To analyse various risk factors of incisional hernia
2) To study various surgical modalities (onlay mesh repair, preperitoneal mesh repair and laparoscopic mesh repair).
3) To study short term post operative complications.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

"Hernios" a Greek word, from which the term hernia was derived- meaning a bud, a branch or an off shoot. As early as in 1500bc hernia and its treatment was mentioned in Egyptianebers papyrus. The rapid development of abdominal surgery from late 19th century also paved way for increased incidence of incisional hernia. Due to its high incidence and recurrences a large number of surgical repair attempted over past century.

On study of literature, Gerdys in 1836 done repair of large ventral hernia, first ever recorded procedure. Maydl's in 1886 first used a technique which closely approached modern day repair standards. He dissected the layers of anterior abdominal wall and repaired them individually. Witzel (1890), Goepel (1900), Barlet (1903), Mc Arthur(1901) described continuous fascial sutures from the external oblique.

The use of tantalum gauze was introduced by Kuntz and Throckmorton in 1948. They had disadvantage of metal fatigue with fragmentation, perforation of bowel with fistula and sinus formation. Judd and Gibson in 1912 and 1916 respectively, described repair of hernia based on extensive dissection of scar and surrounding tissues. Gibson in 1920 claimed to repaired successfully,8 cases of huge incisional hernia using lateral relaxing incisions over the anterior rectus sheath. Nutall (1932), Dixon (1929), Watson (1938), Maingot (1958) and

Madden (1964) described techniques involving extensive dissection which mostly lead to recurrence because the tissues were sutured.

Repair using fascia lata grafts in form of sheets or strips were first reported in 1901 by Mc Arthur, later Kirschner(1910) and Gallie in 1921,1923,1924 and 1932 popularised this method. Hamilton (1968) published a large series of patient treated with fascia lata grafts. Use of skin in sheets or strips was advocated by Mair in 1945. However these techniques were associated with high recurrence rates due to absorption of tissues and encountered complications such as dermoid cyst, sinuses and even malignancy changes due to graft harvesting.

Burton in 1959 described darning methods involving external oblique aponeurotic strips, Gosset (1953) used skin ribbon sutures while Moloney in 1948 used nylon. Floss silk repair was reported by Maingot in 1958.

The new era of darning started when Abel in 1960 used stainless steel wire for constructing new linea alba. A decade later, Hunter in 1971 described using monofilament nylon. This culminated to shoelace darn technique description by Abrahamson in 1987.

Prosthetic hernia repair, a modern era, began in 1958 when Usher.F.C reported his approach using polyethylene (marlex) mesh. Polyamide (nylon) mesh and recently polytetra fluro ethylene (PTFE) were introduced which revolutionized the incisional hernia repair lead to

discontinuation of earlier methods and was abandoned which became only of historical interest.

Mesh repair was largely associated with seroma formation, to prevent this Usher in 1971 recommended the use romovac drain and post operative application of encircling Elastoplast girdle. Durden and Pemberton (1974) advocated the use of closed suction drain for non absorbable mesh insertion. More innovative methods like use of full thickness abdominal skin (Marchac and kaddoura in 1983), muscle and myocutaneous flaps(by Ger and Duboy'sin-1983) were tried for large, complex, recurrent hernia. Silastic polymeric silicone mesh and polyglycolic acid mesh by Jenkin et al in 1983and combination of mesh and aponeurotic graft (Adloff and Arnaud in 1987) were reported. Expanded weave PTFE mesh was studied by Berlinear in 1989.

Jeyant Sharma et al stated in their study prolene mesh is most common variety requiring in hernia through lower midline. Monofilament polypropylene stimulates strong fibroblastic response and marked resistance to infection as reported by Lichtenstein in 1991. Polypropylene mesh is an excellent synthetic material for hernia repair which incorporates body tissues easily. Prolene mesh has been extensively used because of good results with asepsis, greatest tissue in growth with least complication rate of all mesh available. During 1990s,

Retro rectus mesh placement, commonly known as stoppa technique became popular.

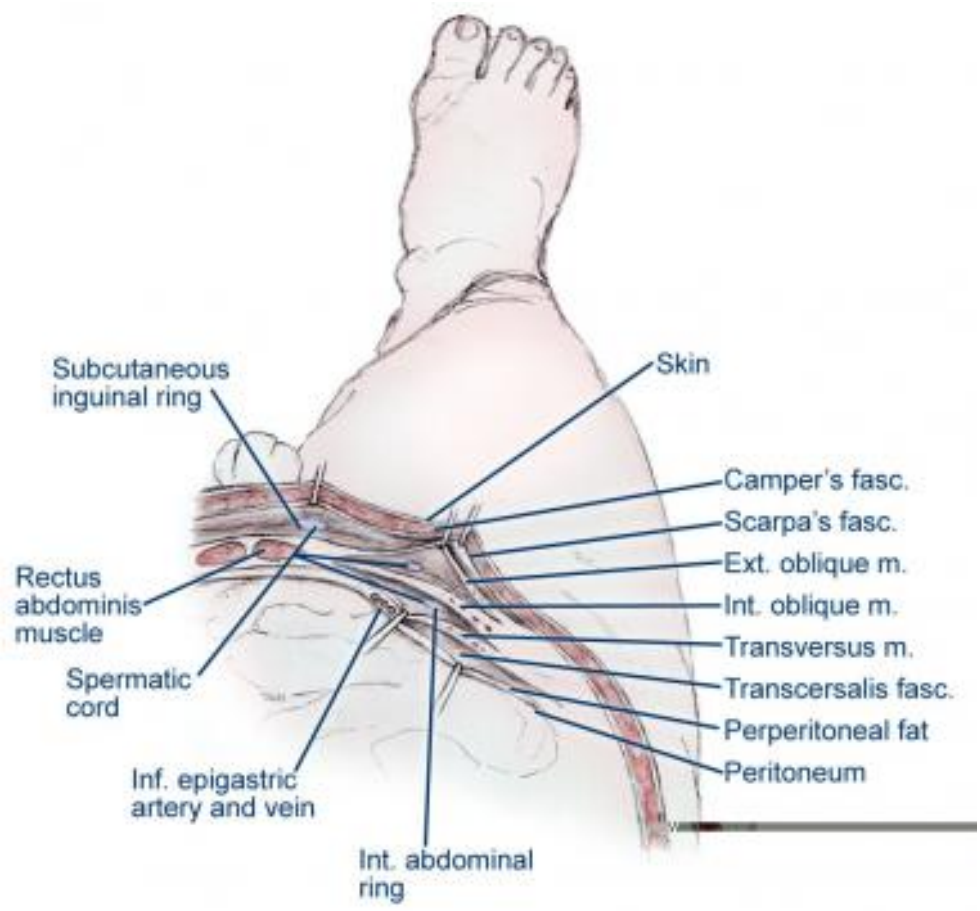
Laparoscopic hernia repair came into limelight by 1990s and use of composite mesh has been promoted towards laparoscopic repair as more suitable for incisional hernia repair as it has less post operative pain, complications and early return to work with comparable recurrence rates but more expensive, time consuming and technically demanding.

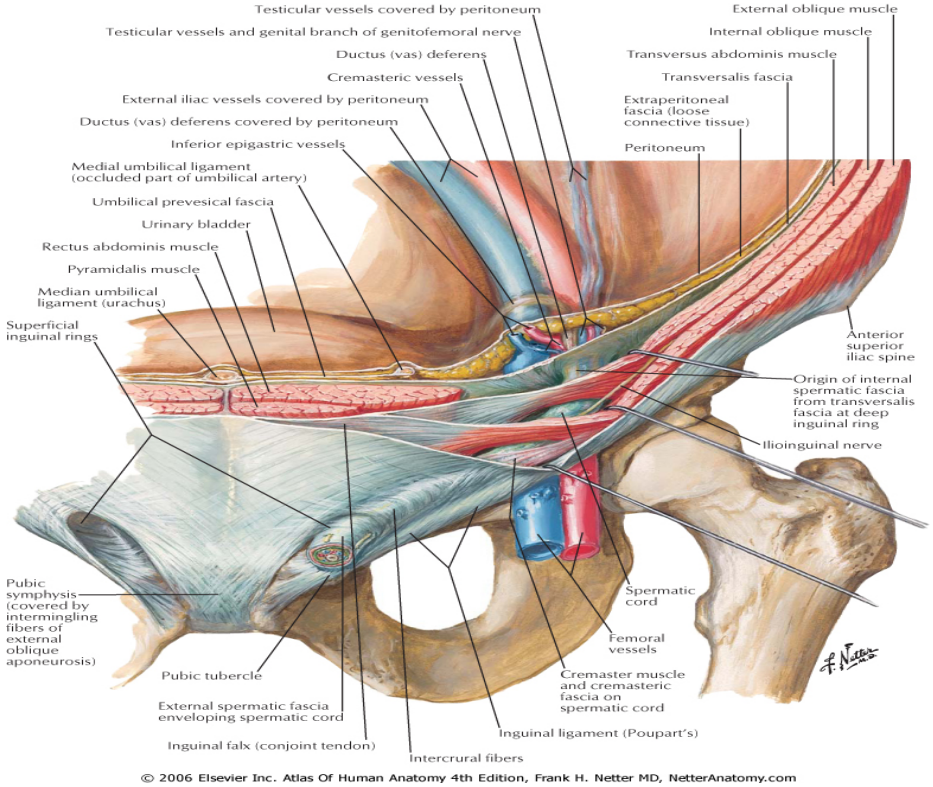
ANATOMY OF ANTERIOR ABDOMINAL WALL:

Abdomen is the portion of the body lying below the diaphragm which is bounded above by lower margin of thorax and below by pelvis, iliac crest, inguinal ligament.

Anterior abdominal wall has the following layers :

1. Skin,
2. Subcutaneous tissue,
3. Superficial fascia,(camper &scarpa’s)
4. External oblique muscle,
5. Internal oblique muscle,
6. Transversus abdomini muscle,
7. Fasciatransversalis,
8. Preperitoneal fatty tissue,
9. Peritoneum.





SKIN:

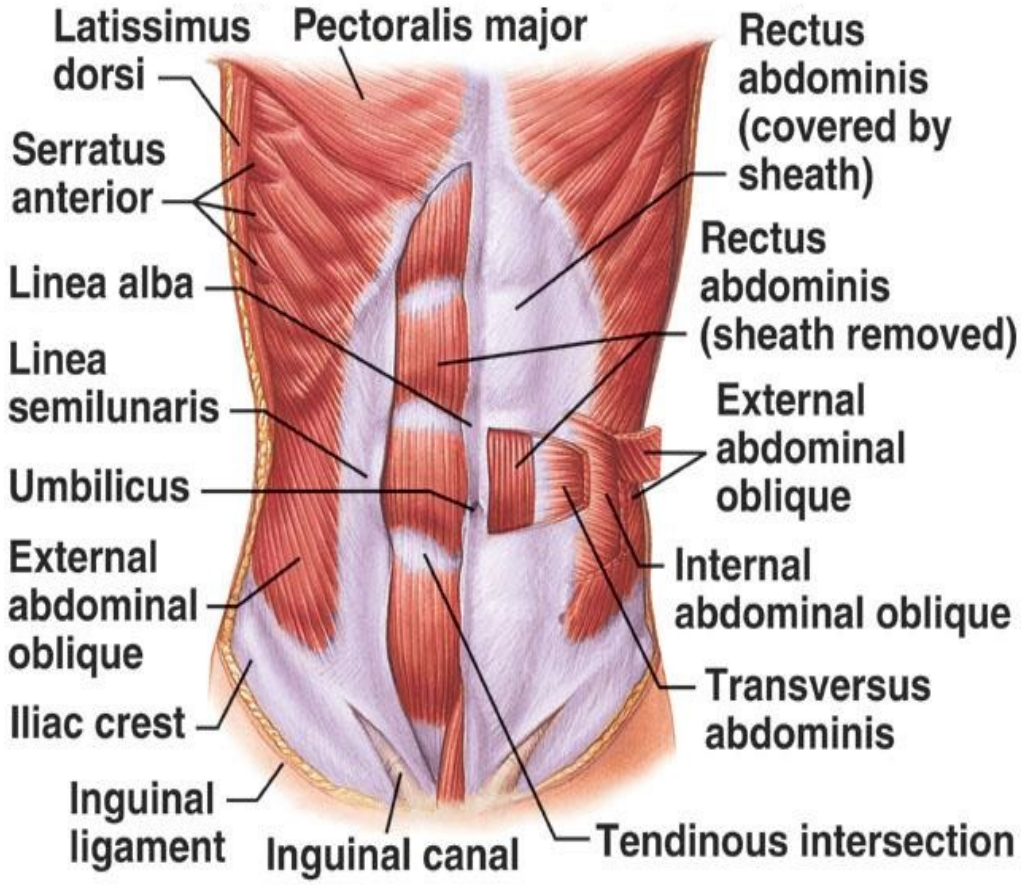
Langer's lines (cleavage lines) are topological lines which run horizontally on a map of the human body. They correspond to collagen fibres in the dermis, and are generally parallel to the orientation of the underlying muscle fibres. These line should be considered while making an incision because incision made along the langer's line heal by a thin line scar while incisions across it make a wide heaped scar.

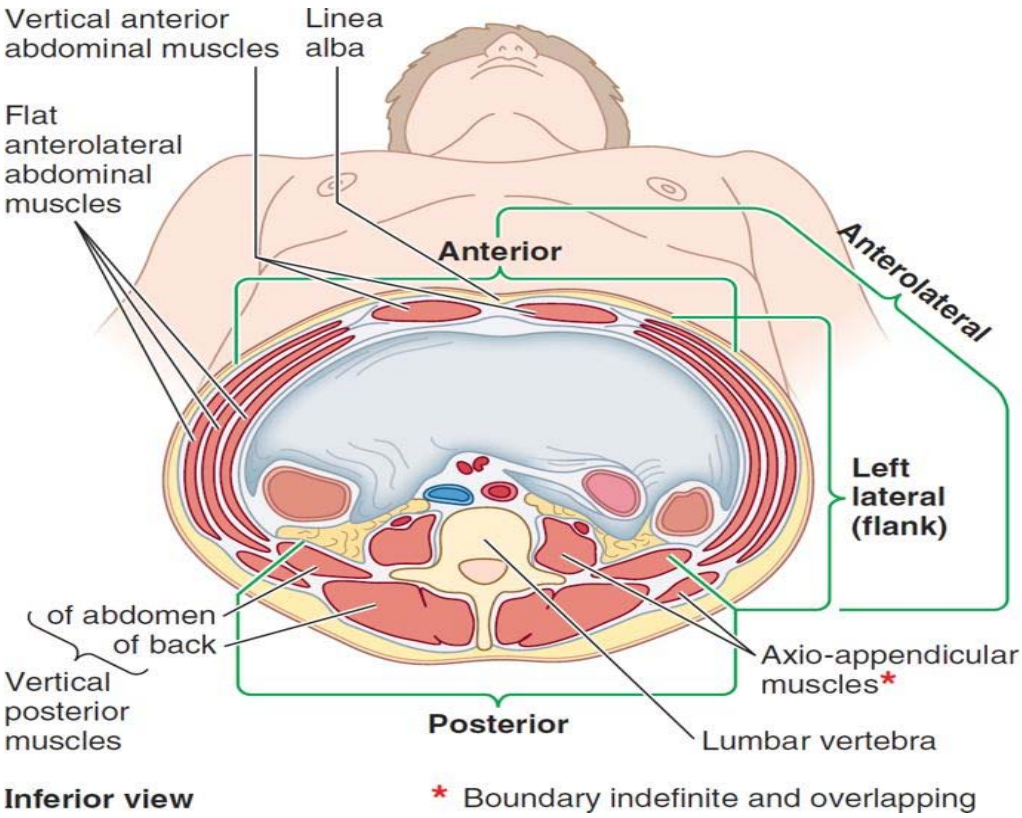
SUPERFICIAL FASCIA:

It has two layers. Fascia camper is the fatty superficial layer; fascia scarpa is the deep fibrous layer. Abdominal wall has no deep fascia. Fascia scarpa blends with the fascia lata of the thigh below and is adherent to linea alba and pubic symphysis medially .It continues below and medially to form dartos fascia and colles fascia. Proper approximation of scarpa's fascia is required to achieve proper skin approximation after surgical incision.

MUSCULAR LAYER:

External oblique, internal oblique and transverses abdominis present on either side of the midline and rectus abdominis, pyramidalis present ventrally.


Latissimus dorsi
Pectoralis major
Rectus abdominis (covered by sheath)
Serratus anterior
Rectus abdominis (sheath removed)
Linea alba
Linea semilunaris
External abdominal oblique
Umbilicus
Internal abdominal oblique
External abdominal oblique
Transversus abdominis
Iliac crest
Inguinal ligament
Inguinal canal
Tendinous intersection


Vertical anterior abdominal muscles
Linea alba
Flat anterolateral abdominal muscles
Anterior
Anterolateral
Left lateral (flank)
of abdomen
of back
Vertical posterior muscles
Axio-appendicular muscles*
Posterior
Lumbar vertebra
Inferior view
* Boundary indefinite and overlapping

EXTERNAL OBLIQUE:

It is the largest of the flat muscles of the abdomen. It originates from lower eight ribs and runs from lateral to medial direction. Upper fibres insert into xiphoid process, linea alba, pubic symphysis, pubic crest and pectineal line of pubis whereas the lower fibres inserted into the iliac crest in its anterior half. It forms the inguinal ligament which extends from anterior superior iliac spine to the pubic tubercle. Its deficiency just above the pubic crest is a triangular opening called the superficial inguinal ring.

INTERNAL OBLIQUE MUSCLE:

It originates from the lateral half of the inguinal ligament, anterior two third of the iliac crest and thoraco lumbar fascia. These fibres course upwards, medially, forwards and inserts into the lower 5 ribs in its upper part. Lower fibres insert in the 7,8,9 costal cartilages, xiphoid process, linea alba, pectineal line of pubis and pubic crest. Internal oblique muscle prevents herniation via the inguinal canal by shortening and contracting itself. It continues as cremasteric muscle as it accompanies the spermatic cord in the scrotum.

TRANSVERSE ABDOMINIS MUSCLE:

It is the smallest of the anterior abdominal wall muscles which originate from the anterior two third of the inner lip of iliac crest, lateral one third of the inguinal ligament, inner surface of the lower 6 costal cartilages, spines of the lumbar vertebra and iliopsoas fascia. The muscle runs transversely. That part of the muscle above the arcuate line runs behind the rectus abdominis while the part below arcuate line is above rectus abdominis. The lowermost fibres join with the lowermost fibres of the internal oblique muscle to form the conjoint tendon. It forms the aponeurotic arch which lies above the Hesselbach's triangle.

TRANSVERSALIS FASCIA:

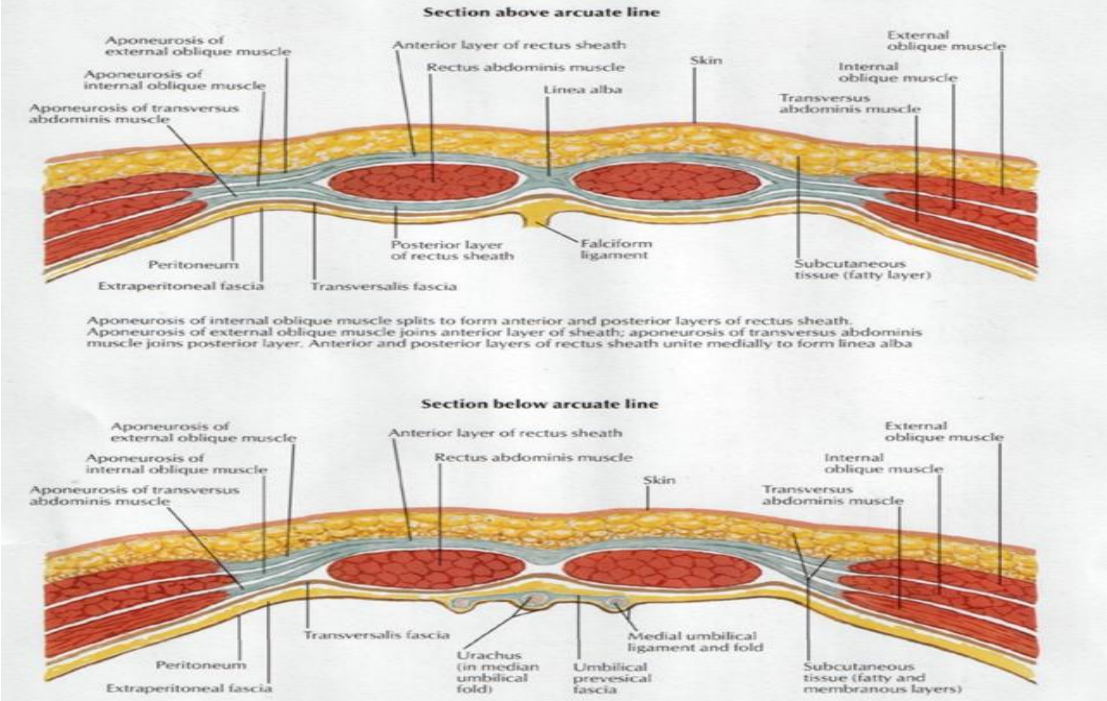
It is present deep to the transverse abdominis muscle and covers completely around the abdominal cavity. It unites with the muscle and aponeurotic fascicle and strengthens the areas where aponeurotic fibres are weak and sparse. Hence by definition a hernia results where transverslis fascia is weak.

RECTUS ABDOMINIS MUSCLE:

Its lateral head arises from the lateral part of pubic crest and medial head arises from the anterior pubic ligament. Inserted into the 5,6,7 costal cartilages and xiphoid process. These muscles lie parallel along anterior abdomen in midline separated by lineaalba. Tendinous insertions separate these muscle into three parts. One at the level of umbilicus, one at the xiphoid process and one midway between the two.

RECTUS SHEATH:

It is formed by aponeurosis of external oblique, internal oblique and transverse abdominis muscles. Above the arcuate line the anterior rectus sheath envelopes the rectus muscle with the external oblique and anterior lamella of internal oblique aponeurosis whereas the posterior rectus sheath is formed by the posterior lamella of internal oblique, transverse abdominis and transversalis fascia passing posterior to rectus sheath. Below the arcuate line external obliqueaponeurosis, internal oblique aponeuroses and transverse abdominisaponeurosis pass anterior to rectus abdominis and posteriorly it is covered only by fasciatransversalis, preperitoneal fatty tissue and by parietal peritoneum only.



PYRAMIDALIS:

Small triangular muscle present superficial to rectus abdominis arising from pubis and inserting into part of linea alba between pubic symphysis and umbilicus.

CREMASTER:

Lower fascicles of internal oblique accompany the spermatic cord and extendsinto the scrotum as cremasteric muscle.

LINEA ALBA:

It is a band of intersections of fibres of aponeurosis extending from xiphoid process to pubic symphysis. It separates the rectus abdominis muscles in the midline.

PREPERITONEAL SPACE:

It is the space between the fascia transversalisand parietal peritoneum. Contains adipose and areolar tissue. Structures which run through the space are:

Inferior epigastricvassels, medial umbilical ligaments (remnant of fetal umbilical artery), median umbilical ligament(remnant of fetal allantoic stalk /urachus), falciform ligament of the liver.

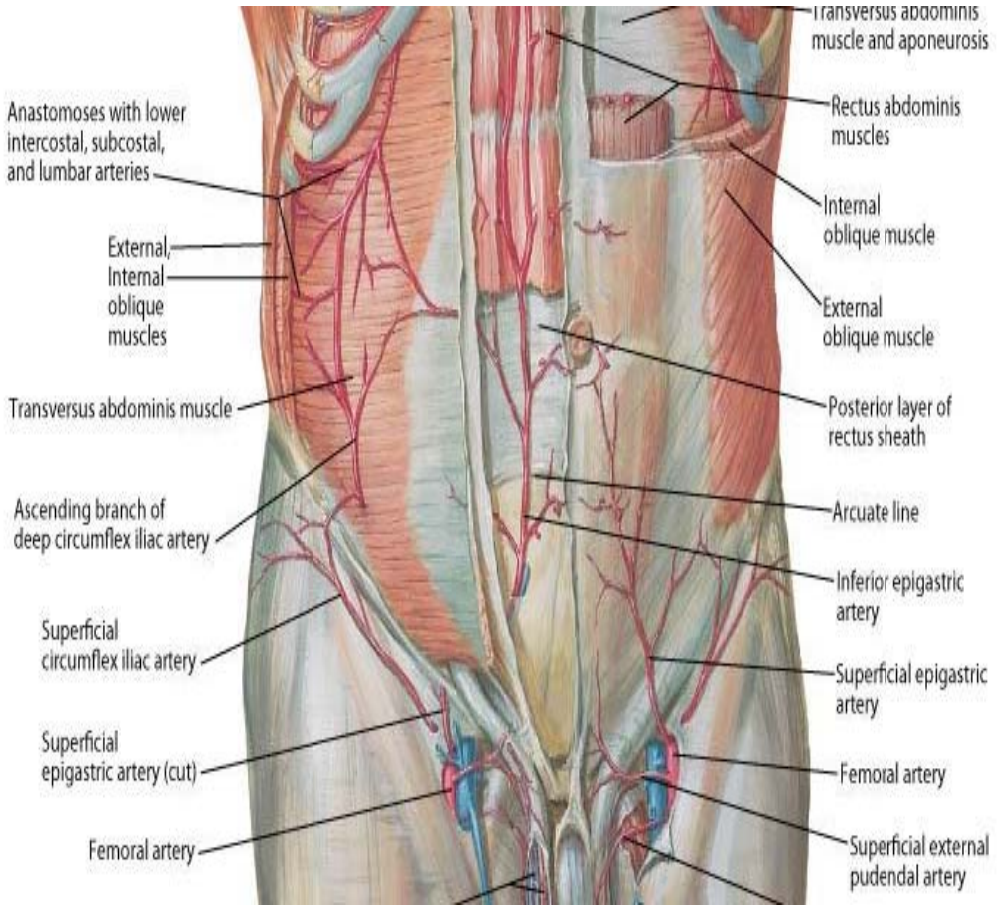
PERITONEUM:

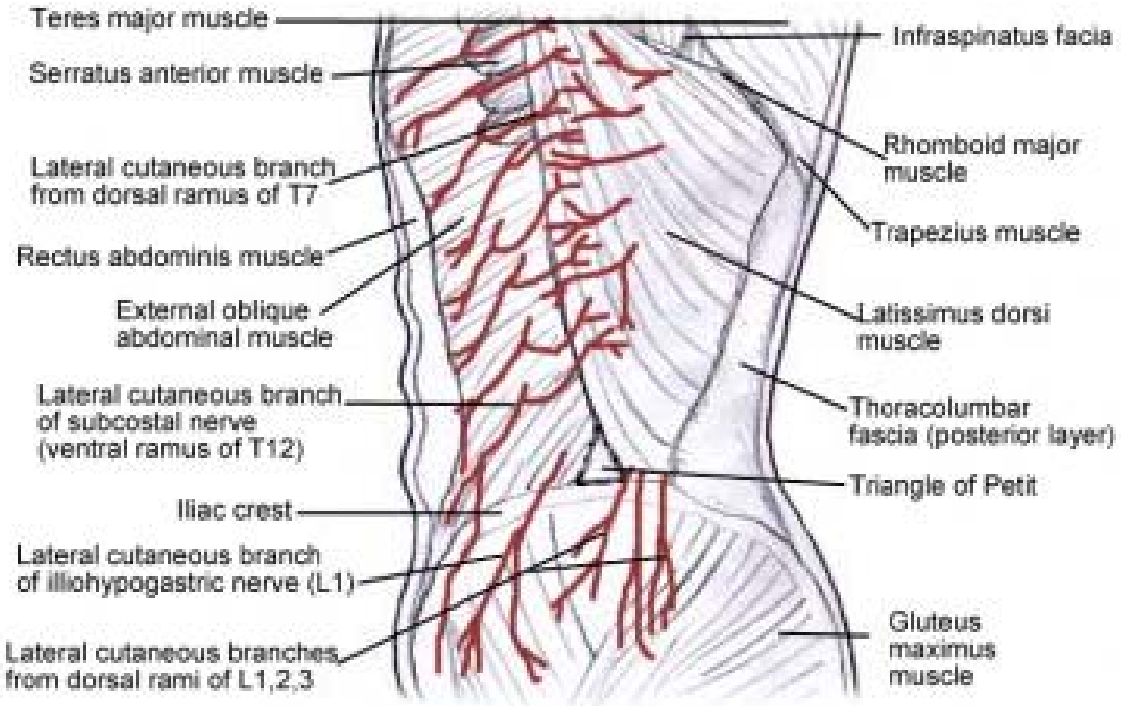
It is deepest layer of anterior abdominal wall which is made up of dense, irregular connective tissue and is lined on the inside by simple squamous mesothelium.

VASCULAR SUPPLY-ANTERIOR ABDOMINAL WALL

ARTERIAL SUPPLY:

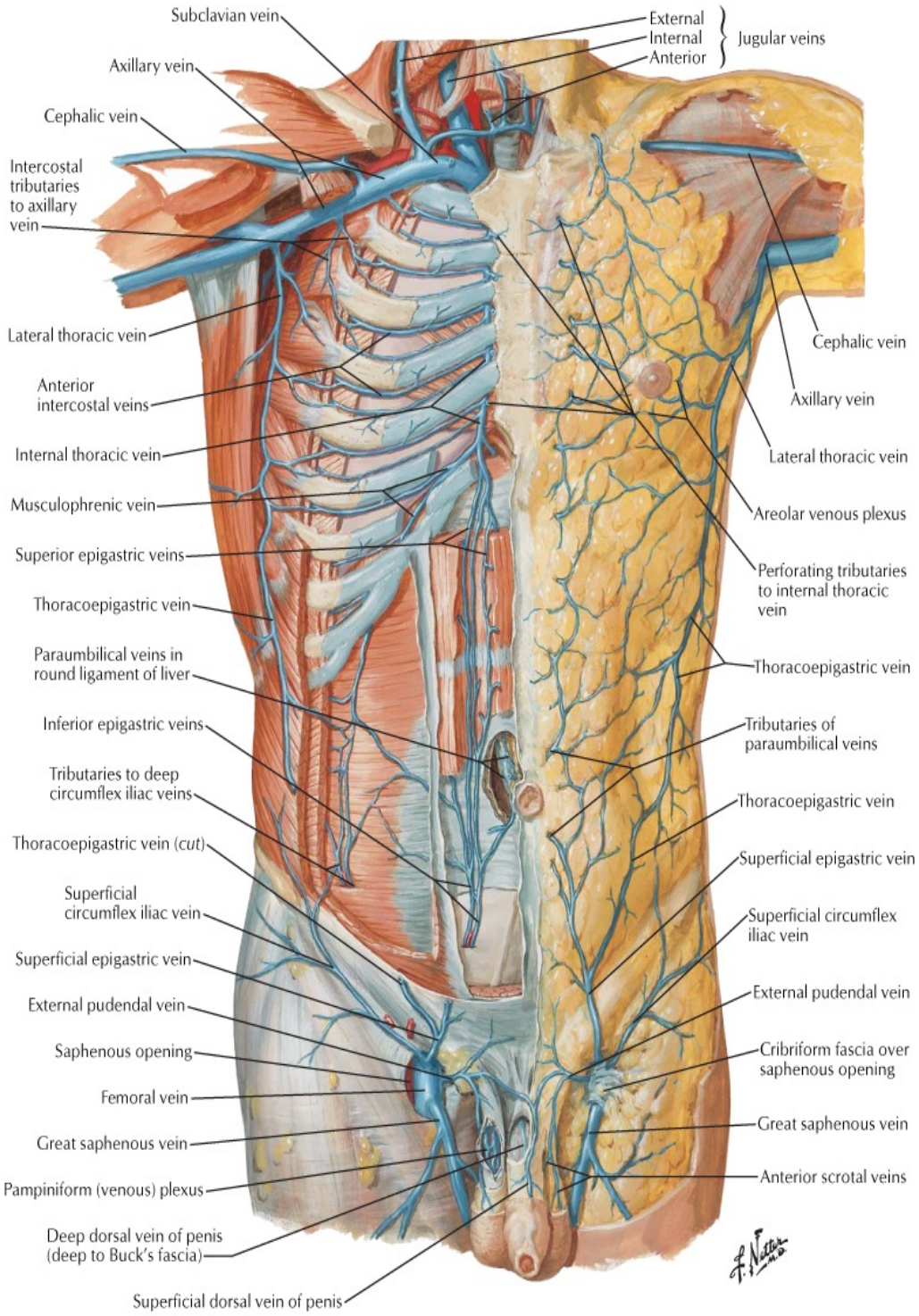
Receives its blood supply from the lower 6 intercostal arteries, 4 lumbar arteries, superior epigastric artery, inferior epigastric artery, deep circumflex iliac artery. The intercostal and lumbar artery runs between the transverse abdominis and internal oblique muscle along with the intercostals, iliohypogastric, ilioinguinal nerves. Extensions from these vessels pierce the rectus sheath and communicate freely with superior epigastric and inferior epigastric branches. The superior epigastric artery, branch of internal mammary artery, runsvia the costoxiphoid space present in the diaphragm along the posterior surface of rectus muscle. It then enters the rectus sheath to anastamose with inferior epigastric artery. Inferior epigastric artery a branch from the external iliac artery runs in the preperitoneal fatty tissue and enters the rectus sheath laterally at the level of semilunar line of Douglas. An ascending branch from the deep circumflex iliac artery arising from the external iliac artery supplies the anterior abdominal wall muscles above iliac crest near ASIS.


Transversus abdominis muscle and aponeurosis
Anastomoses with lower intercostal, subcostal, and lumbar arteries
Rectus abdominis muscles
Internal oblique muscle
External, Internal oblique muscles
External oblique muscle
Transversus abdominis muscle
Posterior layer of rectus sheath
Ascending branch of deep circumflex iliac artery
Arcuate line
Inferior epigastric artery
Superficial circumflex iliac artery
Superficial epigastric artery
Superficial epigastric artery (cut)
Femoral artery
Femoral artery
Superficial external pudendal artery


Teres major muscle
Infraspinatus facia
Serratus anterior muscle
Rhomboid major muscle
Lateral cutaneous branch from dorsal ramus of T7
Trapezius muscle
Rectus abdominis muscle
External oblique abdominal muscle
Latissimus dorsi muscle
Lateral cutaneous branch of subcostal nerve (ventral ramus of T12)
Thoracolumbar fascia (posterior layer)
Triangle of Petit
Iliac crest
Lateral cutaneous branch of iliohypogastric nerve (L1)
Gluteus maximus muscle
Lateral cutaneous branches from dorsal rami of L1,2,3

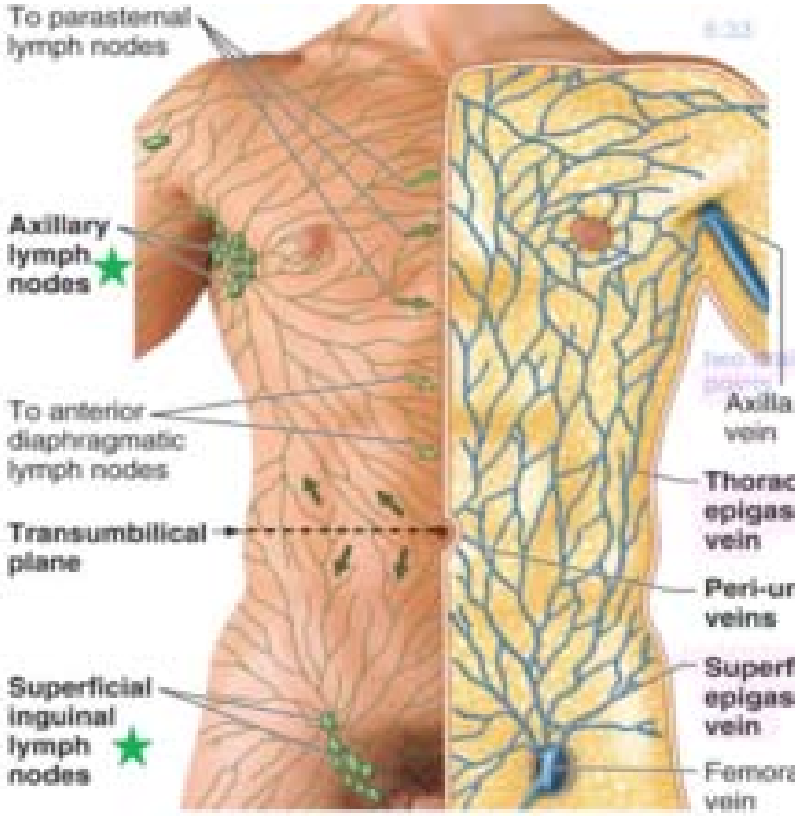
VENOUS DRAINAGE:

Superficial veins above the umbilicus drains via the internal mammary, intercostals, long thoracic veins into the superior vena cava. Superficial veins below the umbilicus, superficial epigastric, circumflex iliac, pudendal veins drain into the saphenous vein which in turn drain into the inferior vena cava. Numerous anastamoses present between the supraumbilical and infraumbilical venous systems provide collaterals through which venous return to the heart will be facilitated in case of any obstruction to SVC or IVC. Para umbilical vein passes along the ligamentumteres to the left tributary of portal vein to communicate between superficial abdominal wall veins and portal veins in portal venous obstruction patients. Portal blood flow is directed from the high pressure portal venous system to the anterior abdominal wall veins through the paraumbilical veins. Portal venous obstruction leads to dilated superficial paraumbilical veins called caput medusa.


Subclavian vein
Axillary vein
Cephalic vein
Intercostal tributaries to axillary vein
Lateral thoracic vein
Anterior intercostal veins
Internal thoracic vein
Musculophrenic vein
Superior epigastric veins
Thoracoepigastric vein
Paraumbilical veins in round ligament of liver
Inferior epigastric veins
Tributaries to deep circumflex iliac veins
Thoracoepigastric vein (cut)
Superficial circumflex iliac vein
Superficial epigastric vein
External pudendal vein
Saphenous opening
Femoral vein
Great saphenous vein
Pampiniform (venous) plexus
Deep dorsal vein of penis (deep to Buck's fascia)
Superficial dorsal vein of penis
External
Internal
Anterior
Jugular veins
Cephalic vein
Axillary vein
Lateral thoracic vein
Areolar venous plexus
Perforating tributaries to internal thoracic vein
Thoracoepigastric vein
Tributaries of paraumbilical veins
Thoracoepigastric vein
Superficial epigastric vein
Superficial circumflex iliac vein
External pudendal vein
Cribriform fascia over saphenous opening
Great saphenous vein
Anterior scrotal veins

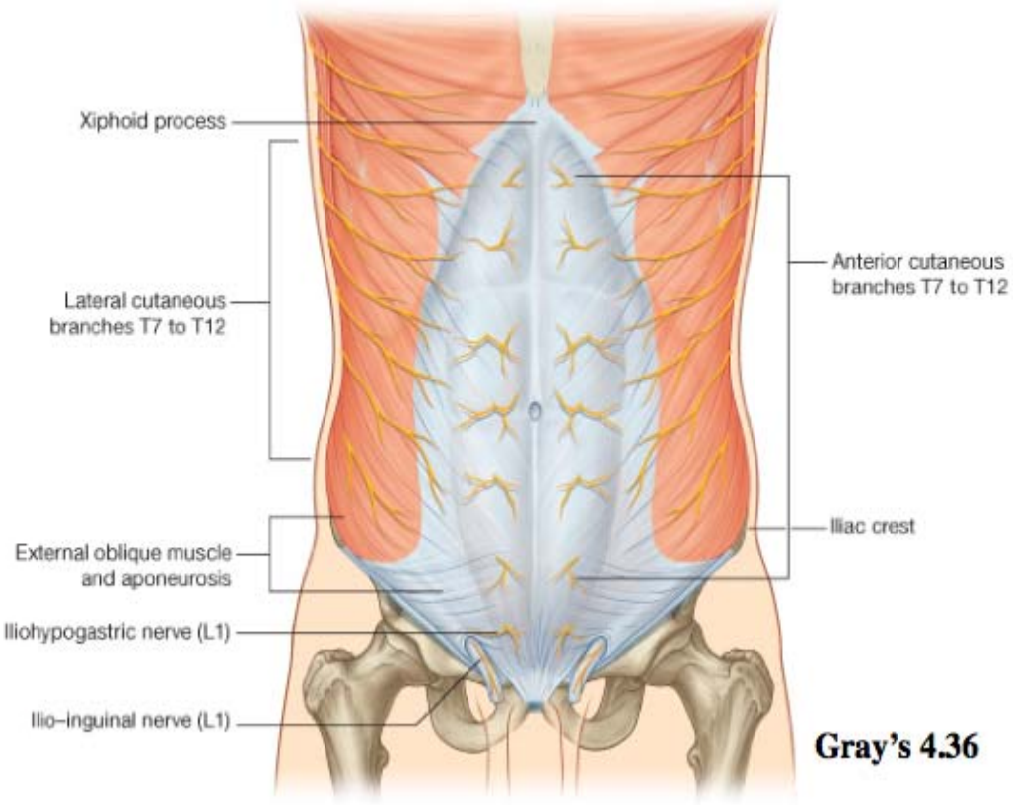
LYMPHATIC DRAINAGE:

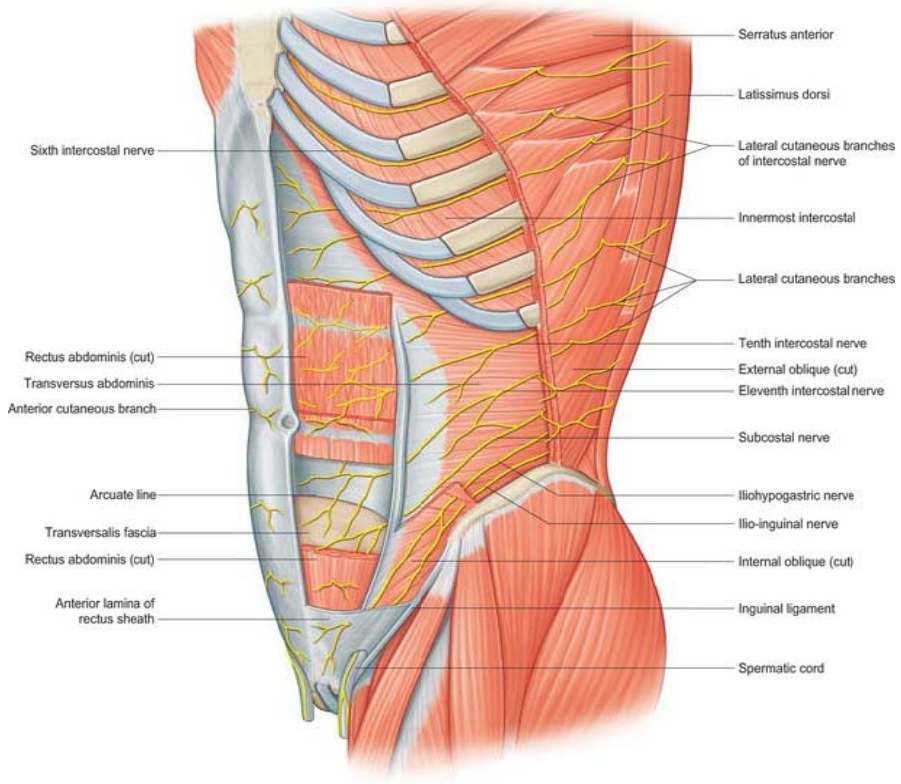
Lymphatics from the supraumbilical region drain into axillary group of lymph nodes. Lymphaticsfrom the infraumbilical region drain into the superficial inguinal lymph nodes. Lymphatics from the liver run along the ligamentum teres and join with the lymphatics of the anterior abdominal wall.



NERVE SUPPLY:

Anterior division of the thoracic nerves run in the intercostals spaces to the midline in a curvilinear fashion. Upper 6 thoracic nerves form the anterior cutaneous sensory branch near the sternum. The 7 to 12 thoracic nerves runs behind the costal cartilage and lower ribs to enter between the oblique internus and transverse abdominis muscle. These nerves run medially to give motor supply to anterior abdominal wall muscles. They pierce the rectus sheath and give sensory supply to anterior abdominal wall. The anterior division of the tenth thoracic nerve gives sensory innervations to the umbilicus and 12^{th} nerve gives sensory innervations to skin of the hypogastrium region.


Xiphoid process
Lateral cutaneous branches T7 to T12
Anterior cutaneous branches T7 to T12
Iliac crest
External oblique muscle and aponeurosis
Iliohypogastric nerve (L1)
Ilio–inguinal nerve (L1)
Gray's 4.36


Serratus anterior
Latissimus dorsi
Sixth intercostal nerve
Lateral cutaneous branches of intercostal nerve
Innermost intercostal
Lateral cutaneous branches
Tenth intercostal nerve
Rectus abdominis (cut)
External oblique (cut)
Transversus abdominis
Eleventh intercostal nerve
Anterior cutaneous branch
Subcostal nerve
Arcuate line
Iliohypogastric nerve
Transversalis fascia
Ilio-inguinal nerve
Rectus abdominis (cut)
Internal oblique (cut)
Anterior lamina of rectus sheath
Inguinal ligament
Spermatic cord

ANATOMY OF ABDOMINAL INCISIONS

The success of any abdominal surgeryrequires adequate exposure, achieved by appropriate incision and by proper closure to limit unnecessary morbidity. Three primary requirements for an incision to be used for any given surgery,

1. Optimal exposure
2. Be flexible
3. Allows reliable closure.

To prevent complications, certain principles to be followed during abdominal incisions are:

- Should give ready and direct access to the organ or the part to be dealt with.
- Incision should be extensible in a direction if needed.
- Appropriate positioning of the patient and adequate lighting.
- Muscle must be split or divided in direction of their fibres rather than to cut across.
- Innervation and vascular supply of abdominal musculature should be minimally interfered to reduce post operative complication of dehiscence.
- Incision must transverse muscle rather than fascia.
- Opening made in the layers of abdominal wall better not to be superimposed.

- Use of oblique and transverse incision as they are stronger and less prone for disruption, defect and hernia formation.
- Re entry into abdomen preferably made through previous scar site.
- Integrity of abdominal wall to be maintained with fascial closure
- Incision along langers line especially in children to avoid hypertrophic scar and unsightly appearance.

PRINCIPLES GOVERNING ABDOMINAL CLOSURE:

- Tension free suturing of fascia, as tightening results to compromised blood supply and focal necrosis.
- Drainage tube to be placed via separate incision. Entostomies to be brought out via separate incision and not via the main wound.
- Single layered continuous sutured closure is preferable in midline incisions.
- Use of slowly absorbable or non absorbable monofilament suture material to absorbable
- Ratio of suture length to wound length increased to 4:1 reduces incisional hernia significantly.
- If wound tension is anticipated ,deep tension sutures place are left in-situ for 14 days.

SELECTION OF ABDOMINAL INCISION:

Selection of incision based on type of surgery, organ dealt with, rapid accessibility build and nature of the patient, previous surgery and scar site, surgeon's preference and cosmesis.

TYPES OF ABDOMINAL INCISIONS:

Vertical:

Midline(upper/lower), Paramedian , Supra umbilical ,infraumbilical

***Transverse & oblique*:**

Gridiron incision , Kocher's subcostal incision , Pfannenstiel incision, transverse incision and oblique lateral incision for exposure of colon.

Abdomino-thoracic:

For exposure of esophagus ,liver and spleen

Or classified as

Dividing no muscle:

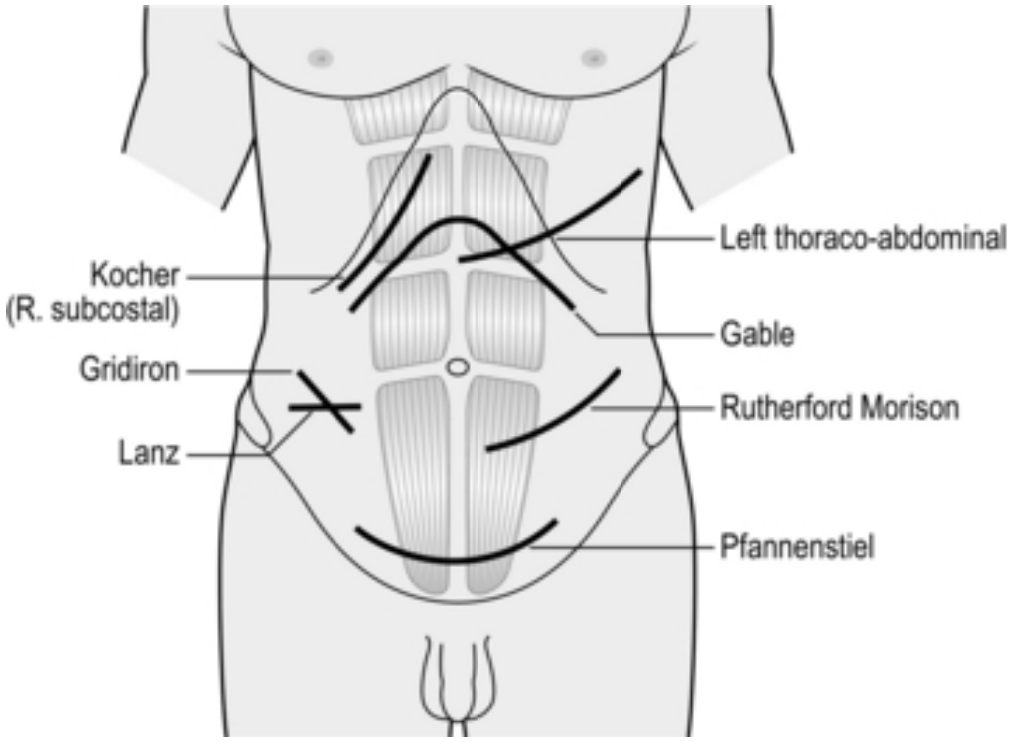
Median, Para median(rectus retracting), Para rectal incision (battle's), Pfannenstiel incision.

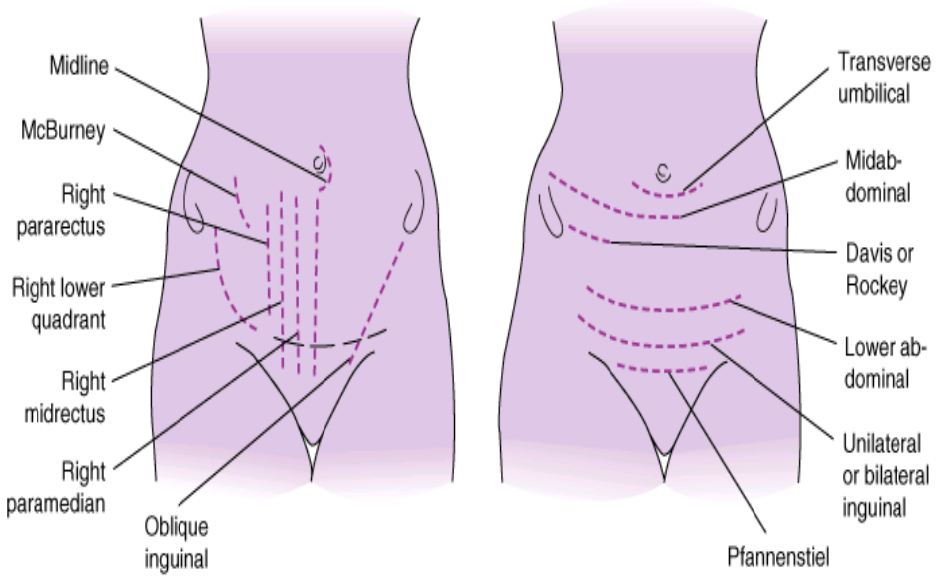
Splitting muscle:

Para median muscle splitting (Mayo Robson), Lateral, Mcburney's,Lanz Incision, Inferior hernia incision.

Dividing muscle:

Subcostal incision (Kocher's), Transverse incision, Rutherford Morrison incision, Morrison's oblique lumbar incision.





MIDLINE INCISION:

It gives excellent exposure of the abdomen. Linea alba can be divided in midline along its entire length from xiphi sternum to pubic symphysis,but more commonly small incision made which may be extended if needed. The main disadvantage of midline incision is that it crosses langer's line and causes unsightly scar especially in children. Advantage is that no nerves or blood vessels encountered. Useful in presence of peritoneal soiling.

PARAMEDIAN INCISION:

Paramedian incision is placed on either side of midline parallely one inch from it. Rectus sheath opened vertically and rectus muscle retracted , then posterior rectus sheath opened vertically. Advantage is strong scar. Disadvantages are more time required, difficulty in performing in presence of previous scar.

RECTUS SPLITTING INCISION:

Incision made at 3-4 cm lateral to midline and divide all structures in line with incision splitting rectus from its insertions. It renders medial part of rectus enervated and atrophic.

RECTUS RETRACTING INCISION:

In this type anterior rectus sheath is divided along skin incision and rectus muscle retracted laterally once freed of its facialattachments. Afterthat posterior rectus sheath , fascia transversalis and peritoneum are

divided along the line of incision. Rectus muscle which left intact provide support to the wound after surgery adding strength to the wound. Posterior rectus sheath and peritoneum closed with vicryl or catgut and anterior rectus sheath closed with prolene.

TRANSVERSE & OBLIQUE INCISIONS:

There are several variations exist. Both the incision need not to be straight in line, some degree of curvature or angulation may vary. Wound may or may not be limited to lateral abdominal wall and rectus muscle on one side. They generally follow Langer's lines of tension and cosmetically appealable than vertical incisions. A proper infraumblical transverse incision will adequately expose pelvic organs, recto sigmoid and rectum.

KOCHER'S SUBCOSTAL INCISION:

This incision is particularly used for gall bladder, biliary tract on right side and for splenectomy on right side. Incision starts about 1-2 inches below xiphi sternum and runs below and parallel to costal margin. Muscles and fascia opened along the skin incision. Disadvantage is time consuming for both opening and closure. Closed in layers for better results.

MCBURNEY'S GRID IRON INCISION:

McBurney in 1894 described this incision for appendicectomy. It is an oblique incision. Rockey Davis modification uses cosmetically

superior transverse incision along the skin crease. If medial extension needed it is achieved by incising anterior rectus sheath retracting rectus muscle laterally. Lateral extension is obtained by dividing external oblique muscle, called Weir extension. Medial and lateral extension of McBurney's incision is called Rutherford-Morrison incision. Ilioinguinal nerve injury is the cause for incisional hernia.

PFANNENSTIEL INCISION:

It is used frequently in females for gynaecological procedures. In males, as for access to the retro pubic space for extraperitoneal retropubic prostatectomy. Incision placed as curving interspinous crease lies approximately 5cm above pubic symphysis. It is usually about 12 cm in length. Not suitable for surgeries other than pelvic organs disease. An advantage is cosmesis,it leaves almost an invisible scar hidden by pubic hair.

LOIN INCISION:

It is often a muscle cutting incision. Posteriorly latissmus dorsi , serratus anterior and quadratus lumborum are divided with skin incision. It may be subcostal or supracostal along superior border of 11^{th} rib. A higher incision gives better access to kidney and adrenals. A further alternative loin incision is lumbotomy,in which vertical incision is made from lowest rib to iliac crest along the lateral border of sacrospinalis and deepened into retroperitoneal space.

ABDOMINO-THORACIC INCISION:

Thease incision provide simultaneous access to abdomen and thoracic cavity by division of costal margin and can be used for access to lower oesophagus or liver. It is often avoided these days owing to poor patient post operative respiratory function. Trans -diaphragmatic or transhiatal approaches are favoured nowadays.

CLOSURE OF ABDOMEN:

Abdominal wall closure is a common denominator of all abdominal procedures. It is one of fore most thing for every surgeon to now. The method by which abdomen wall is closed depend on teacher's preference and the young surgeon often reluctant to change these methods later in his/her career. Closure of abdominal wall is performed in multitude fashion and there is large abundance of different tailored method on this procedure.

The ultimate goal of abdominal wound closure is to restore its functionas far as possible. The method used should be technically simple that its results are comparable as they are for experienced surgeon, when performed by trainee. Patient should leave with reasonably cosmetic scar and most importantly it should minimize the incidence of wound infection, wound dehiscence, incisional hernia and sinus formation.

CLOSURE OF PERITONEUM:

It was practiced traditionally to close the peritoneum based on the premise to restore normal anatomy, the risk of infection and hernia will be reduced and adhesions will be avoided later. On modern era with advent of randomized clinical trials these practice were questioned. Ellis and Heddle in 1977, first reported their results of randomized study between non closure and closure of parietal peritoneum. No difference in incidence of wound dehiscence and hernia was observed. Several similar

randomized control trials for others incisions also showed the similar results. It is now concluded that closure of parietal peritoneum is not necessary, therefore not recommended. Moreover it lead to slight increase in operating time and more post operative pain and increased chances for adhesions as suggested by some studies.

CLOSURE OF FASCIA:

The Facscia closure may be done by two techniques

1. Layered closure

2. Mass closure

In layered closure, anterior and posterior rectus sheaths closed in two different layers, with peritoneum incorporated in posterior rectus. Mass closure involves closure of all musculo-fascial layers as single layer with or without including peritoneum. Several clinical trials have compared the single layered to mass closure of abdominal wall. Some shows increase morbidity in terms of dehiscence and incisional hernias in layered closure and some study shows no difference, but no study showed advantage of layered closure over mass closure.

It has been studied that continuous, running suture is more secure than interrupted sutures. Continuous suture allows distribution of tension across the suture line and ability of the wound to adjust to stress and strains during post operative period. It also minimizes tissue ischemia , necrosis and wound rupture. One disadvantage is that, if the suture thread

breaks off it jeopardize the entire wound. Clinical studies however shower similar post operative morbidities between two methods.

The use of no absorbablevs. absorbable sutures in closing the fascia has been long debated each having its own disadvantage. Reabsorbable suture has an intrinsic loss of tensile strength mostly leading to wound dehiscence and incisional hernia. On contrast non absorbable material may lead to scar pain and fistula formation. To overcome this , synthetic absorbable sutures with property of delayed degradation have been introduced. The reabsorbable sutures like polyglycolic acid, polydiaxone, polyglyconate has shown to be equally effective as non absorbable suture. However , some studies showed better outcome when compared to nonabsorbable sutures.

Use of monofilament suture is better than multifilament sutures. Multifilament sutures provide nidus for bacterial growth leads to wound infection , sepsis and incisional hernia. Bacteria settles into the groove of multi filament sutures and escape phagocytosis. But clinical trials showed that there has not been increased incidence of wound failure in monofilament sutures. Monofilament catgut sutures causes greater inflammatory reaction , short duration of tensile strength leads to high incidence of incisional hernia.

SUBCUTANEOUS TISSUE CLOSURE:

Subcutaneous tissue closure becomes important nowadays, owing to obesity. As vascular supply of subcutaneous tissue is less it leads to soft tissue infection and its potential space for seroma formation, closure is warranted. Absorbable sutures are used.

SKIN CLOSURE:

Surgical wounds of skin mostly are clean or clean contaminated wound. Several closure techniques such as simple, mattress sutures, subcuticular suture, surgical staples, surgical tape and adhesive glues are used. Main goals are tissue approximation, acceptable cosmesis, minimizing wound infection and postoperative pain.

ETIOLOGICAL FACTORS

BASED ON PATIENT CONDITION:

AGE: Increased incidence of incisional hernia is seen in patients above 60 years of age as noted by Bucknall et al. Healing is delayed in elderly patients.

SEX: There is increased incidence of incisional hernia in females when compared to males due to multiple pregnancies which causes thinning of aponeurosis which may give away easily.

OBESITY: Increased omental and subcutaneous fat led to increased strain to the incisional wound during body movements during the early postop period.

Increased fat led to poor muscle mass which led to poor muscle tone which is the important factor in developing incisional hernia. Perkin found a tenfold increase in the incidence of wound dehiscence in obese women when compared to normal women who underwent hysterectomy. Ellis group noted a three times increase in incidence of hernia and its recurrence of hernia in obese patients.

GENERAL CONDITION: Wasted and malnourished patients, those on chronic steroid therapy, those suffering from avitaminosis, jaundice, diabetes, anaemia, chronic renal and liver failure. Immunosuppression is more prone for incisional hernia as sepsis leads to catabolism which leads to poor wound healing.

BASED ON POOR SURGICAL TECHNIQUE:

NON ANATOMICAL INCISIONS:

These are commonly seen in vertical pararectus incision made along the lateral border of rectus sheath. Here the tissues medial to the incision atrophies as the nerves and vessels are severed. Hernias are less common in oblique and transverse incisions when compared to vertical incision.

CLOSURE:

Layered closure led to more incidence of incisional hernias when compared to single layer mass closure. The same was reported by Pudeley et al.

SUTURE MATERIAL:

Complete collagen formation and maturation takes about one year. Therefore 80% of the tensile strength is achieved only after 6 months. Until then suture is responsible for strength of the wound for the first 6

months. Hence absorbable suture materials such as chromic catgut, vicryl should not be used to close laparotomy incisions. They lose almost fifty percent of the tensile strength in 2 days and twenty days respectively. Silk and linen being biological sutures disintegrate after 2 months. The ideal material to close laparotomy incision is monofilament stainless steel wire.

SUTURING TECHNIQUES:

Increased tension in the stitch causes local ischemia leading to wound infection and wound dehiscence. Multiple knots leads to foreign body reaction which leads to wound infection and sinus formation. Incisional hernia is more when the ratio of suture length: wound length is less than four. Rate of wound infection is more if the stitch length is more than 5 cm. Including muscle, peritoneum and subcutaneous tissue has harmful effects.

TENSION:

As demonstrated by Bartett closing wound under tension led to high incidence of wound dehiscence because the constant pull of the abdominal wall muscle opposite the suture will create necrosis of the tissue.

SEPSIS:

It is the 2nd major cause for wound dehiscence. Cellulitis, fasciitis and necrosis of tissues at the site of incision weakens the tissues making tissues pull apart when intraabdominal pressure increase.

DRAINAGE TUBE:

Drainage tubes kept at the incision site cause postop hernias as the tissues along the tube track is not sutured and left open.

POST OP CONDITION:

Abdominal distension due to post op paralytic ileus, post op retching, vomiting, urinary retention increases the strain on the wound site and may cause incisional hernia.

OPERATION TYPE:

Certain surgical procedure such as appendicitis, diverticulitis, perforated peptic ulcer, peritonitis, pancreatitis, malignancy, resurgery within 6months of the initial procedure through the same incision site, inflammatory bowel disease have high tendency to be followed by incisional hernia.

POST OP WOUND DEHISCENCE/ BURST ABDOMEN:

This occurs when suture knot slip or when the number of sutures made is not enough. Incidence of hernia is increased by one to ten percent in wounds healed by primary healing and thirty percent more for those wounds healed after dehiscence and reclosure.

LATE HERNIA

Those hernias which occur in a completely healed wound after 5 - 15 yrs or more after surgery.

ETIOLOGY:

TISSUE FAILURE:

Rodrigues described that there is increase in amorphous substance of elastic fibres and decrease in oxytalan fibres due to aging. This along with raised intra abdominal pressure caused by chronic constipation, chronic cough, prostate hypertrophy are causative factors for late hernia.

COLLAGEN ABNORMALITIES:

Reduced hydroxyproline formation and alteration in the diameter of collagen fibres lead to deficiency of collagen therefore causing abnormal collagen production and it maintenance which is a reason for recurrent hernia in some patients.

INCIDENCE

In spite of various good improvement in techniques in closure of abdominal wall, incidence is still high. It depends on the various risk factors. The incidence of incisional hernia through various studies varies between 1.4% - 14%. Mostly 90% of hernia occurs in first 3 years. Incidence is higher in patients with DM and high BMI and after wound dehiscence. Various newer techniques to repair incisional hernia has been reported, still none of them proved to be the best approach because each associated with its own complications. Various articles published on incidence of incisional hernia showed increase in incidence by 3.9 folds during decades 1991 to 2000 and 2001 to 2010. Recurrence of incisional hernia is a major concern for surgeons as repeat surgery is difficult to encounter and also results in poor outcome. Recurrence for anatomical repair is found to be between 30-50%. Risk of recurrence for mesh repair is approximately around 10%.

CLINICAL MANIFESTATION:

Patient comes with complaints of bulge from the operated sight aggravated by coughing and straining associated with pain, discomfort and dragging sensation. Asymptomatic in sixty percent of the patients.

Ulceration may be seen in large dependent hernia due to pressure necrosis. These hernia may sometimes rupture rarely. Strangulation of the hernia will cause intestinal obstruction and strangulation. Incomplete obstruction will manifest as colicky abdominal pain and vomiting.

INVESTIGATIONS:

Usually a clinical diagnosis

- USG, High frequency mode ,can also show an impalpable hernia, particularly in obese patients.
- Complete blood count
- Urine routine
- Fasting & Random blood sugar.
- Urea, creatinine
- ECG, chest x ray
- Blood grouping and cross matching

PREVENTION:

- Use non absorbable suture material. Using a twin stranded suture material is better than using a single thick strand.
- Prefer mass closure to layered closure leaving peritoneum unsutured.
- Meticulous surgical techniques such as gentle handling of tissues, taking minimum tissue in haemostat, cauterising instead of tying bleeders, not leaving dead space in the wound.
- Prophylactic antibiotics to reduce local septic complication.
- Don’t approximate rectus sheath with tension instead use PTFE, Darn repair or Marlex mesh using monofilament non absorbable sutures.
- Use mesh soaked in antibiotic solution. Irrigate wound margins with kanamycin, bacitracin, saline, betadine or tetracycline. Leave open skin and subcutaneous tissue where sepsis is anticipated.
- If wound infection is suspected use a fine suction tube to drain the site by passing it through a paraincisional stab wound instead of bringing it out through operated wound.
- Improve general condition of patient. Correct anaemia, malnutrition, chronic cough due to COPD, constipation.

- General anaesthesia provides adequate muscle relaxation. This along with smooth extubation without coughing, straining, vomiting, retching is advantageous. Frequency of wound disruption is equal after local, inhalational or spinal anaesthesia.

PREOPERATIVE MANAGEMENT OF INCISIONAL HERNIA

- Ensure the following preoperatively before proceeding for surgery:
- Overweight patients should be advised weight reduction before surgery.
- Repair should be delayed for at least one year from the period of previous surgery which caused the hernia. This period is required for maturation of collagen and for drying of tissues.
- All infection and sinuses should heal.
- Maintain skin hygiene. Look for any fungal infection or intertrigo especially in obese and diabetic patients. Use antiseptic solution to the skin twice daily to reduce skin flora. Treat ulcers if any present.
- Stop smoking atleast 2 weeks prior to surgery and begin respiratory physiotherapy and exercises.
- Manage any systemic diseases such as diabetes, hypertension, cardiac diseases, pulmonary pathology.
- Correct hypovitaminosis and anaemia with oral or parenteral medications 3-4 weeks before surgery.
- Low dose heparin can be used prophylactically. 5000 units is given subcutaneously every 8^{th} hour from the night before surgery and can be continued until patient walks and fit for discharge.

- Pnemoperitoneum in some centres are tried therapeutically to stretch the abdominal cavity to easily accommodate hernia contents, to improve diaphragmatic function. Using a 22 gauge needle, 50 ml syringe and 3 way stopcock, 6oo cc of air is injected into the peritoneal cavity and increased 200 ml on alternate days until a volume of 2000 to 2500 cc is reached by end of 2^{nd} week. But complications of this procedure is respiratory distress, subcutaneous emphysema, urinary retention.
- Antibiotics should be administered perioperatively.

TREATMENT

GENERAL CONSIDERATIONS:

For any hernia, ideal treatment is surgery only. Choice of treatment depends upon the size of hernia, symptoms, associated complications and general condition of the patient.

Choice of incision: Transverse closure is used whenever possible. Small portion of skin and subcutaneous tissue may be removed to avoid necrosis of skin edges and it is also cosmetically appealing.

Isolation of healthy fascia: Clean dissection of abdominal wall and identification of all layers facilitates good closure. Sac is exposed and all peri areolar tissue are removed.

Closure of the sac: Sac is opened and the contents are freed from adhesions, viscera reduced and excess omentum may be excised. Sac is closed with delayed absorbable suture(vicryl). Hemostasis is attained as hematoma leads to infection and almost to recurrence.

Mesh vs. Fascial closure: Mesh closure is preferred as most patients are elderly with comorbidities with weak abdominal wall. More over simple fascial closure results in more recurrence than mesh closure.

Relaxing incisions: In case of large recurrent hernias, incision along the external oblique aponeurosis is valuable.

Drains : Drains are placed all repairs except in small defects and in laparoscopic incisional hernia whenever mesh is placed. Suction tube kept in place till drain becomes minimal, mostly upto 5-6 days, but it may vary.

Antibiotics: Prophylactic dose of antibiotics given on the day of surgery and about 5 days post operatively. According to some studies antibiotics are seldom required when there is effective drain unless patient is diabetic.

Good repair of incisional hernia depends on good pre operative preparation, correct technique of repair and adequate post operative care.

INDICATIONS FOR SURGERY:

1. Cosmesis
2. Chronic pain and discomfort
3. Hernia at risk of strangulation due to small neck.
4. History of irreducibility, incarceration and recurrent attacks of subacute obstruction.

CONTRAINDICATIONS:

1. Active skin infections and interring
2. Continuing deep sepsis
3. Extremes of obesity.

OPERATIVE PROCEDURES

Two basic methods are available

1. Primary closure
2. Mesh repair

REPAIR OF ABDOMINAL WALL:

1. Anatomical multi-layered reconstruction
2. Catell's operation in five layers.

OVERLAP METHODS:

1. Layer reconstruction of the defect
2. Modified Mayo's imbrication
3. Vertical overlap of anterior rectus sheath
4. Double breasting method by Judd
5. Muscle flaps

DARN REPAIR:

1. Maingot's keel procedure
2. Shoelace repair
3. Burton's fingered fascia lata graft repair.

NUTTAL'S PROCEDURE:

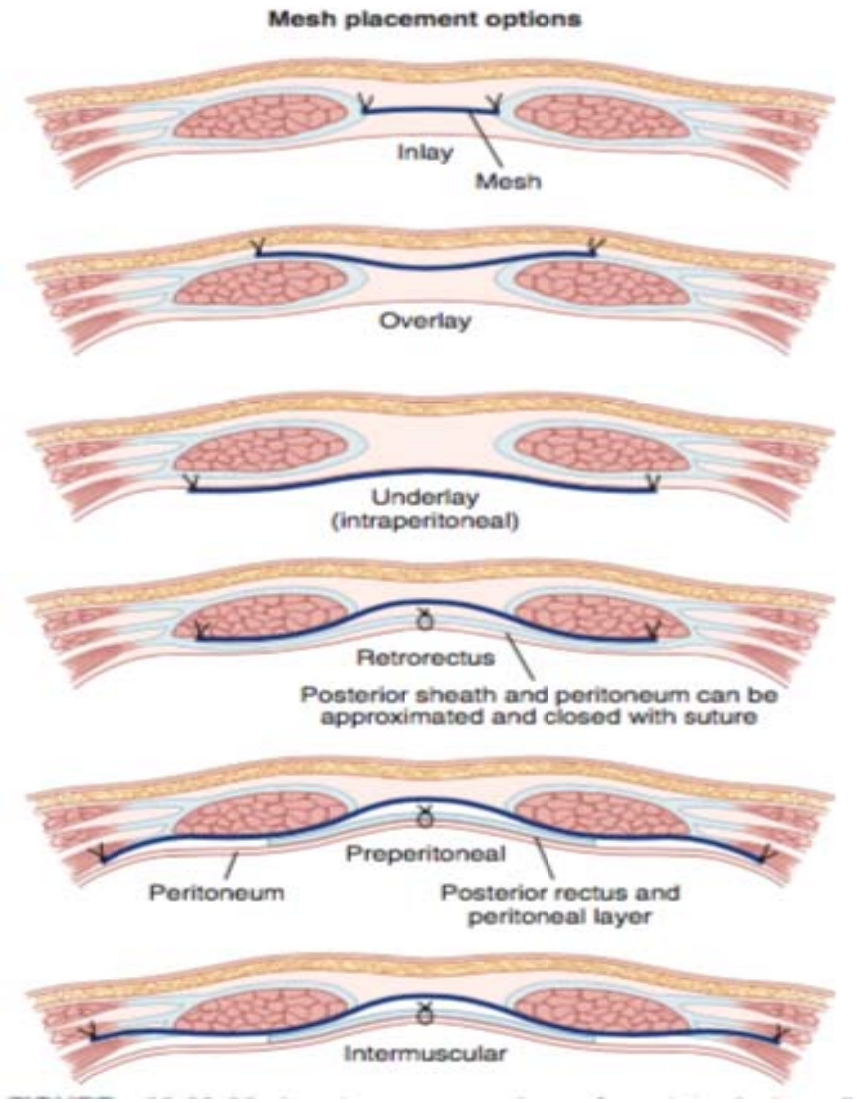
BIOMATERIALS

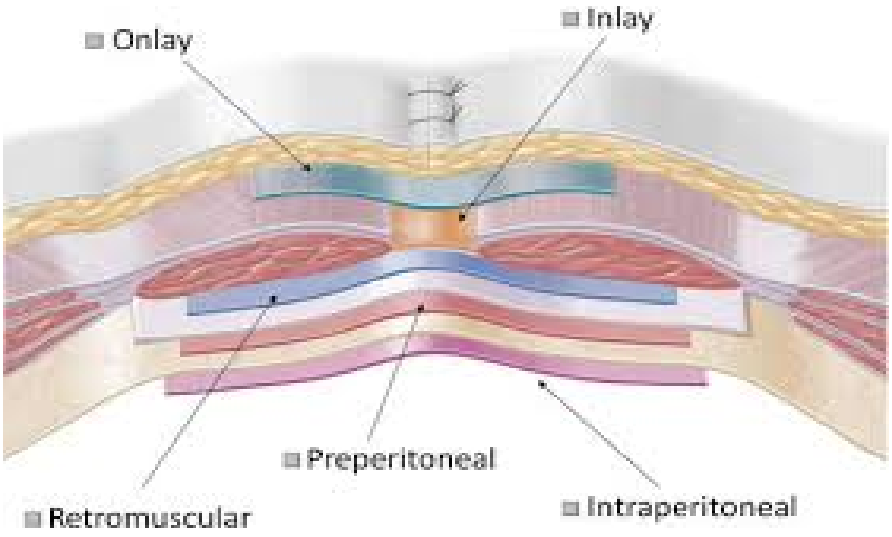
1. Autologous graft
2. Heterologous graft
3. Synthetic mesh

OPEN MESH REPAIR:

1. Onlay mesh repair
2. Inlay mesh repair
3. Sublay mesh repair
4. Underlay mesh repair
5. Combined onlay and underlay mesh repair.

LAPARASCOPIC MESH REPAIR.





Though various methods were tried from inception of incisional hernia, nowadays mesh repair either by open or laparoscopic method was practiced widely, with exception in emergency situations where use of mesh is questioned.

PROSTHETIC MATERIALS-INDICATION:

- ❖ Recurrent incisional hernia.
- ❖ Massive hernia with large defect size.
- ❖ Where future disruption incisional hernia cannot be predicted.
- ❖ Following severe trauma of essential fascial segments.

DESIRABLE QUALITIES OF PROSTHETIC MESH:

In 1952, Cumberland listed several criteria for a foreign material to be used in the hernia repair.

- Tissue reaction – Lack of irritation and it should be inert both biologically and clinically,
- Durability – Indestructible in human tissues;
- Strength
- Flexibility & pliability
- Should be smooth, so as to not injure the vessels or viscera.
- Easy to handle
- Should tolerable against the effects of infection,
- Nonfragmentation
- Non-wandering
- Availability
- Porous nature-it permits ingrowth of fibrous tissues and capillaries.
- Easily sterilizable nature
- Must be Radio lucent

GENERAL PRINCIPLES IN PROSTHETIC MESH REPAIR:

- ❖ Timing – procedure deferred when there is active infection.
- ❖ Undue tension to be avoided.
- ❖ Synthetic non-absorbable monofilament sutures should be used.
- ❖ Achieve adequate hemostasis.
- ❖ Closed suction drain is essential.
- ❖ Routine use of Pre and post op antibiotics.

TYPES OF INCISIONAL HERNIA MESH REPAIR:

Mesh can be placed at different layers to reinforce abdominal wall. These various techniques of mesh repair as follows;

ONLAY MESH REPAIR:

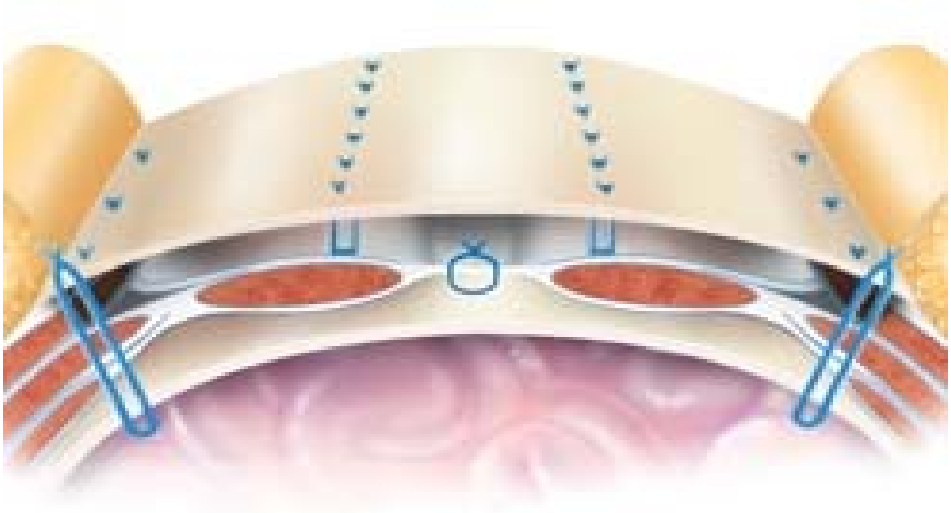
- ➢ Skin incision may be either infraumblical transverse incision or midline incision. Subcutaneous tissues divided with cautery to reach sac, care to be taken not to injure the bowel in sac.
- ➢ Skin subcutaneous flaps dissected away from the sac to expose fascia.
- ➢ After creating flaps all around by about 8-10 cm from defect, sac opened and contents reduced after relieving all its adhesions.
- ➢ Meticulous dissection is needed to avoid injury to contents.

- Once reduced reluctant sac excised and margins of defect is trimmed if unhealthy.
- Sac closed with absorbable suture preferably vicryl (polyglactic acid). Fascia defect is closed with nonabsorbable suture material, prolene (polypropylene).
- Appropriate poly propylene mesh is cut. Mesh should cover atleast 5cm all around the defect. Mesh is fixed with 2-0 Poly propylene sutures.
- One or two romovac suction drain are placed over the mesh and brought out via separate stab incision. Complete haemostasis to be achieved to prevent hematoma and subsequent wound infection.
- Redundant skin and subcutaneous tissues can be excised as a part of abdominoplasty.
- Subcutaneous tissue closed with absorbable sutures.
- Skin closed with non absorbable monofilament sutures.

Onlay graft is not ideal repair for two reasons.

1) Wound repaired primarily with sutures are under greater tension.
2) Since the defect is already closed it is difficult to place full thickness sutures via mesh.

Nevertheless it is most commonly performed repair for its easy approach and short learning curve.

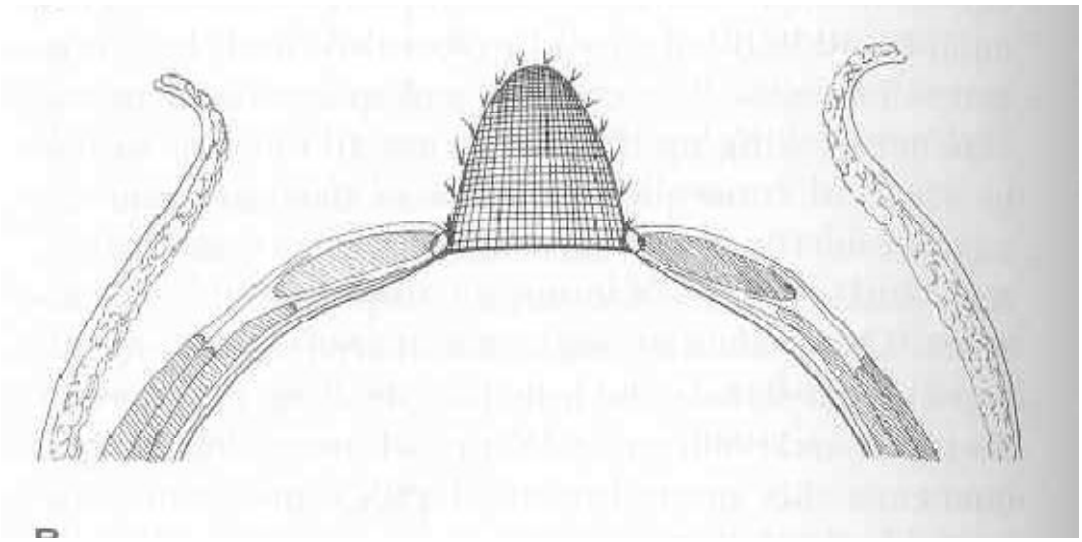


INLAY MESH REPAIR:

- Skin incision made,subcutaneous tissue dissected and flaps raised all around.
- Sac dissected off, opened, contents reduced and redundant sac excised.
- Fascial edges trimmed.
- With either subfascial or intraperitoneal placement mesh is anchored to the solid rim of fascia by mattress sutures placed along the length of the incision on one side with polypropylene sutures.
- Mesh is now tailored too desired width to cover the defect and then a row of mattress sutures placed on opposite side.
- Remaining layer of anterior fascia can be closed if they join or tackled separately to the mesh.

- Reductant skin can be excised. Suction drains placed to prevent hematoma. Subcutaneous tissue closed with absorbable sutures.
- Skin closed and compression dressing applied.

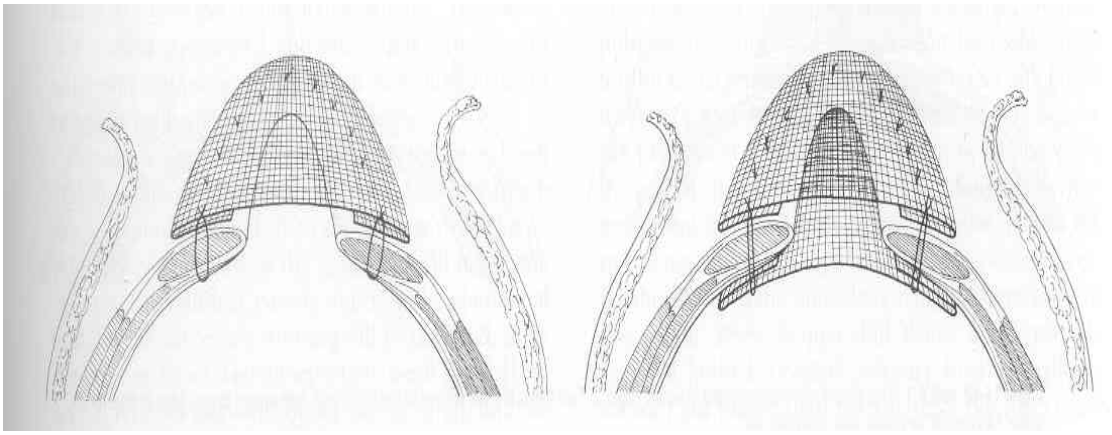
It may seems to be the better technique in large incisional hernia repair but it carries greater risk of complications and high recurrence rate.



DOUBLE LAYER MESH GRAFT:

In this technique deep layer of repair is extraperitoneal but deep to muscles and fascia. Polypropylene mesh is used for deep layers but the disadvantage is adhesions to bowel to peritoneum as result of inflammatory reactions. To prevent these omental interposition is tried. If peritoneal closure is not possible it is advisable to keep polyglactic acid mesh or expanded PTFE mesh. Skin flaps raised suprafascially about 8-

10 cm from defect margin. Deep layer of the prosthesis is cut to bridge defect with 5-6 cm margin all around. Mattress sutures are placed about 1cm from free end of mesh. Both suture ends brought via full thickness of abdominal wall about 5cm from defect. Mesh is repeatedly inserted and partially removed to ensure correct placement of sutures. The second prosthesis cut and placed over the fascia, ends fixed with prolene sutures. Suction drains kept via separate incision. Any redundant skin excised . Hemostasis attained. Subcutaneous and skin closure done dressing applied.



SUBLAY/PREPERITONEAL MESH REPAIR:

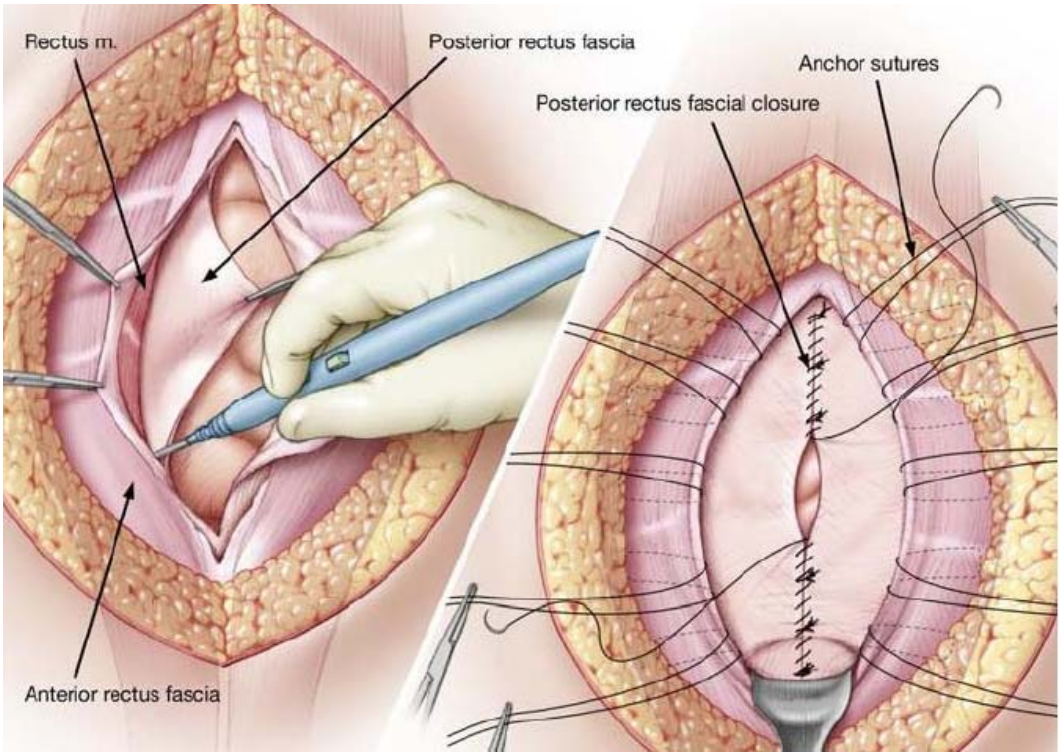
Principle of this mesh repair is the placement of mesh deep to recti muscles, extension of mesh well beyond the defect, suture fixation at periphery and fascial closure over the mesh.

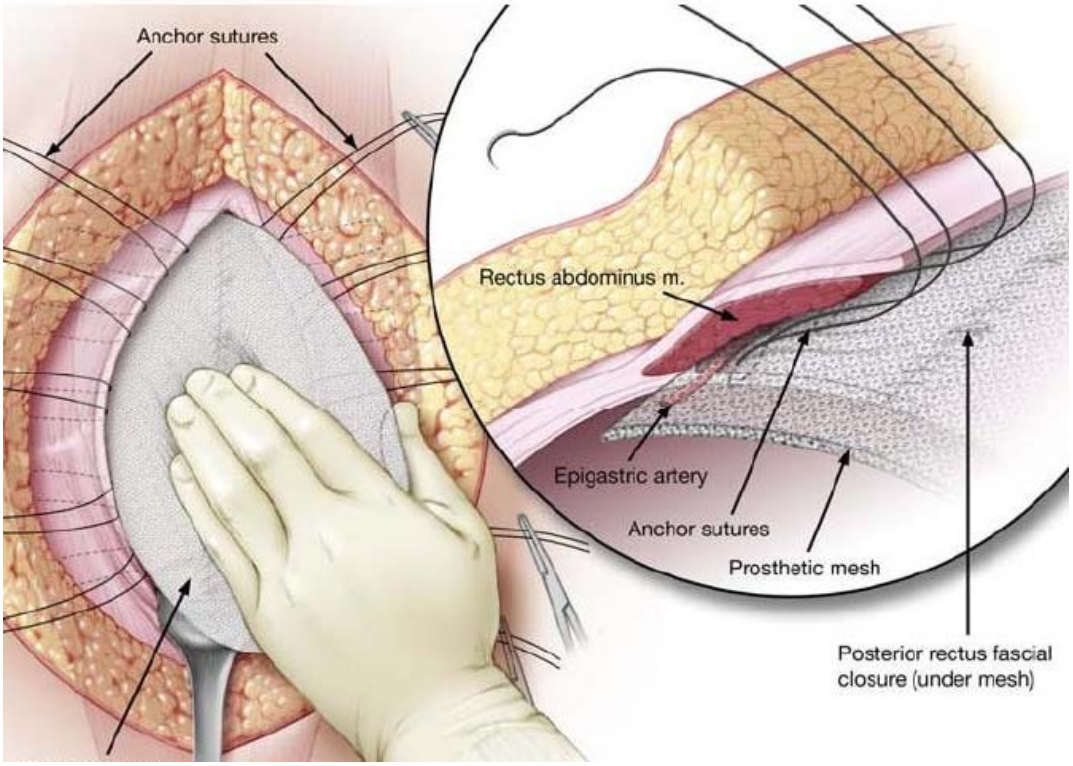
- After skin and subcutaneous incision sac dissected delineated.

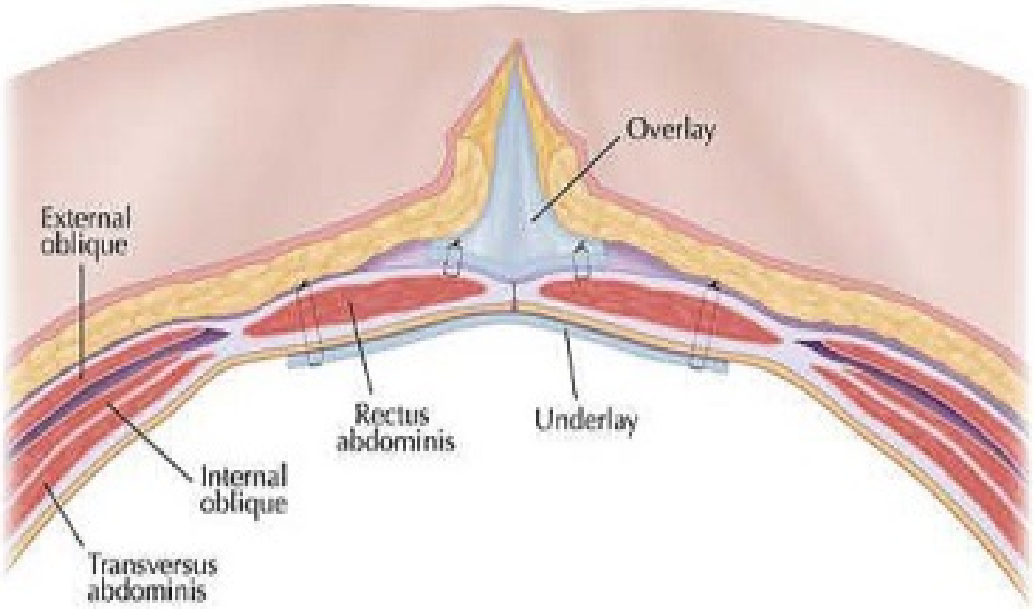
- If the defect is with minimal adhesions to sac, preperitoneal layer dissected which is impossible in most cases.
- Sac opened all contents reduced, adhesions relieved.
- Plane is created between sac and posterior rectus sheath. After creating adequate space.
- Posterior rectus sheath along with peritoneum is closed with prolene. Appropriate polypropylene mesh is kept behind recti and secured with few interrupted 2-0 prolene sutures.
- Suction drain was kept and taken out via separate stab incision. Anterior rectus closed with 1-0 prolene.
- Another drain kept in subcutaneous plane.
- Sub cutaneous tissue and skin closure done.

UNDERLAY MESH REPAIR:

- Skin and subcutaneous tissue divide as sac reached.
- Sac opened, adhesions released and contents reduced. Skin and subcutaneous flaps raised on both sides.
- Proper sized composite mesh (ePTFE mesh) is taken a “U” stitch is placed at 6 and 12’O clock position done.
- Visceral retractor is used to keep away the bowel.
- Mesh introduced into abdominal cavity . Mesh anchoring done by fixing pre tied U stitch at 6 and 12’o clock position.
- Suture then placed in continuous fashion all around via strong fascia in clockwise direction.
- Posterior rectus sheath and anterior rectus sheath closed. Hemostasis achieved.
- Suction drain placed subcutaneously
- Subcutaneous tissue and skin closure done.
- Pressure dressing applied.
- Underlay is newer technique has the advantage of intraperitoneal repair is non-midline defect can be repaired easily.


Rectus m.
Posterior rectus fascia
Anchor sutures
Posterior rectus fascial closure
Anterior rectus fascia


Anchor sutures
Rectus abdominus m.
Epigastric artery
Anchor sutures
Prosthetic mesh
Posterior rectus fascial closure (under mesh)


Overlay
External oblique
Rectus abdominis
Underlay
Internal oblique
Transversus abdominis

LAPAROSCOPIC MESH REPAIR:

Most recent method of incisional hernia repair. It uses ePTFE Mesh(composite mesh). It adheres to the principle of incisional hernia repair without extensive dissection.

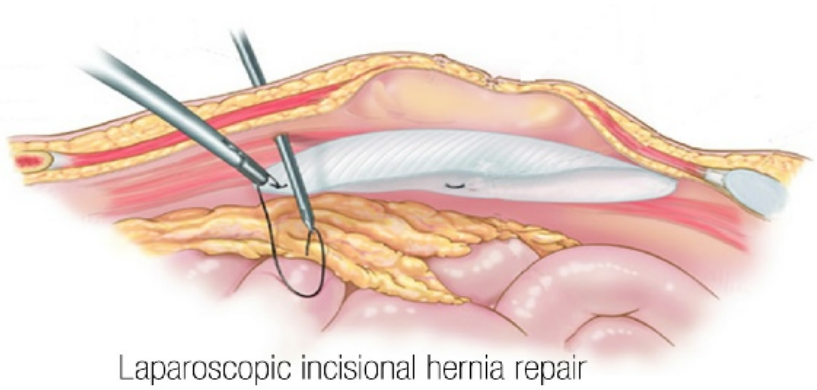
PROCEDURE:

- Ports are inserted as per surgeon's preference. Palmar and epigastric 10 mm port inserted. One or two 5mm working inserted.
- On entering hernia visualised after creating pneumoperitoneum. All adhesions are relieved and contents reduced by careful dissection.
- Dissection carried out meticulously to avoid haemorrhage and bowel injury. Four corners of the mesh are pre tied with prolene stitches with tail and marked with symbols, corresponding points are marked over the abdomen.
- Mesh introduced via 10 mm port .mesh is positioned with smooth part in contact with bowel. Kobler needle introduced at and transfascial anchor stitches are done at subcutaneous level.
- Further mesh fixed at its edges with tackers for every 2 cm.
- All ports are removed, abdomen deflated.
- Fascial closure done with polypropylene in 10 mm port closing site.

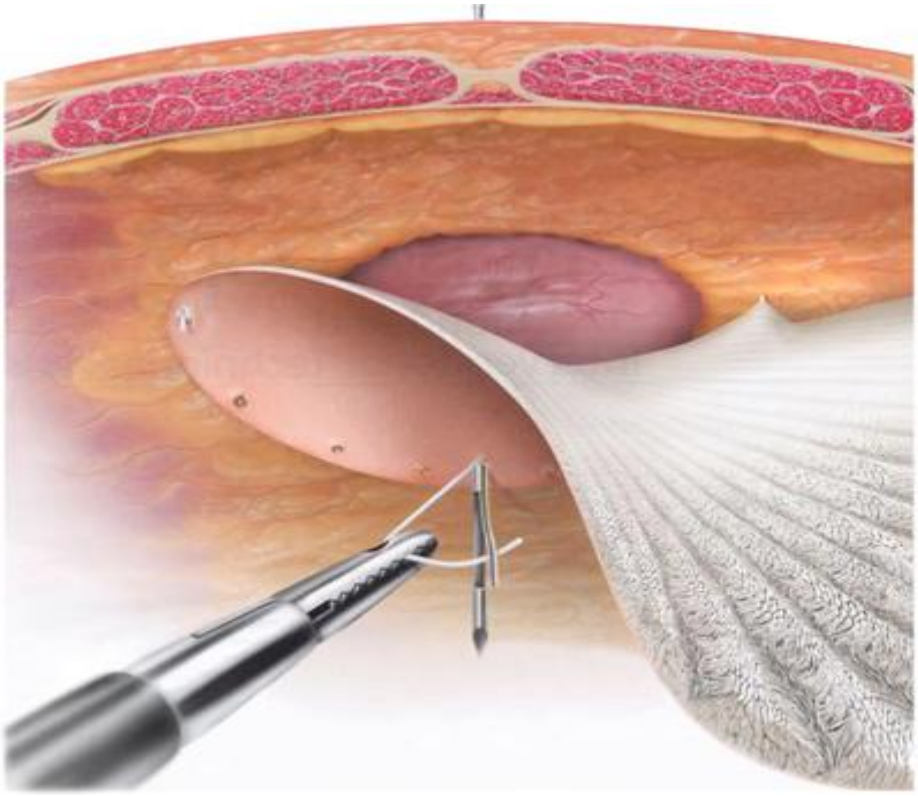
- Skin closure done. Sterile dressing applied.

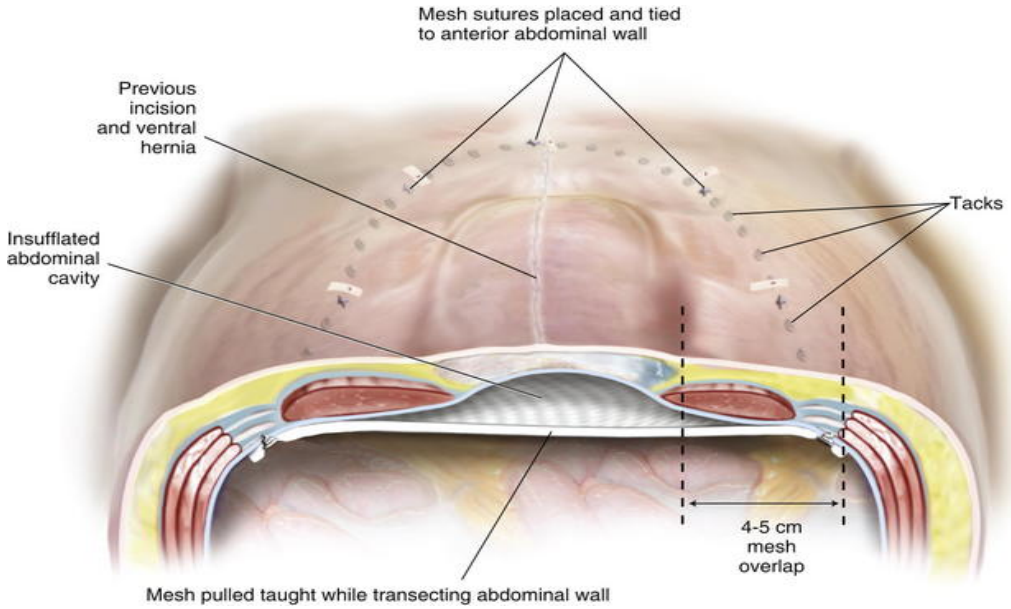
ADVANTAGES :

- Tension free repair
- Extensive dissection was avoided
- Good cosmesis
- Shorter hospital stay, less post operative pain and quick return to activities.



Laparoscopic incisional hernia repair




Mesh sutures placed and tied to anterior abdominal wall
Previous incision and ventral hernia
Tacks
Insufflated abdominal cavity
4-5 cm mesh overlap
Mesh pulled taught while transecting abdominal wall

COMPLICATIONS OF INCISIONAL HERNIA REPAIR:

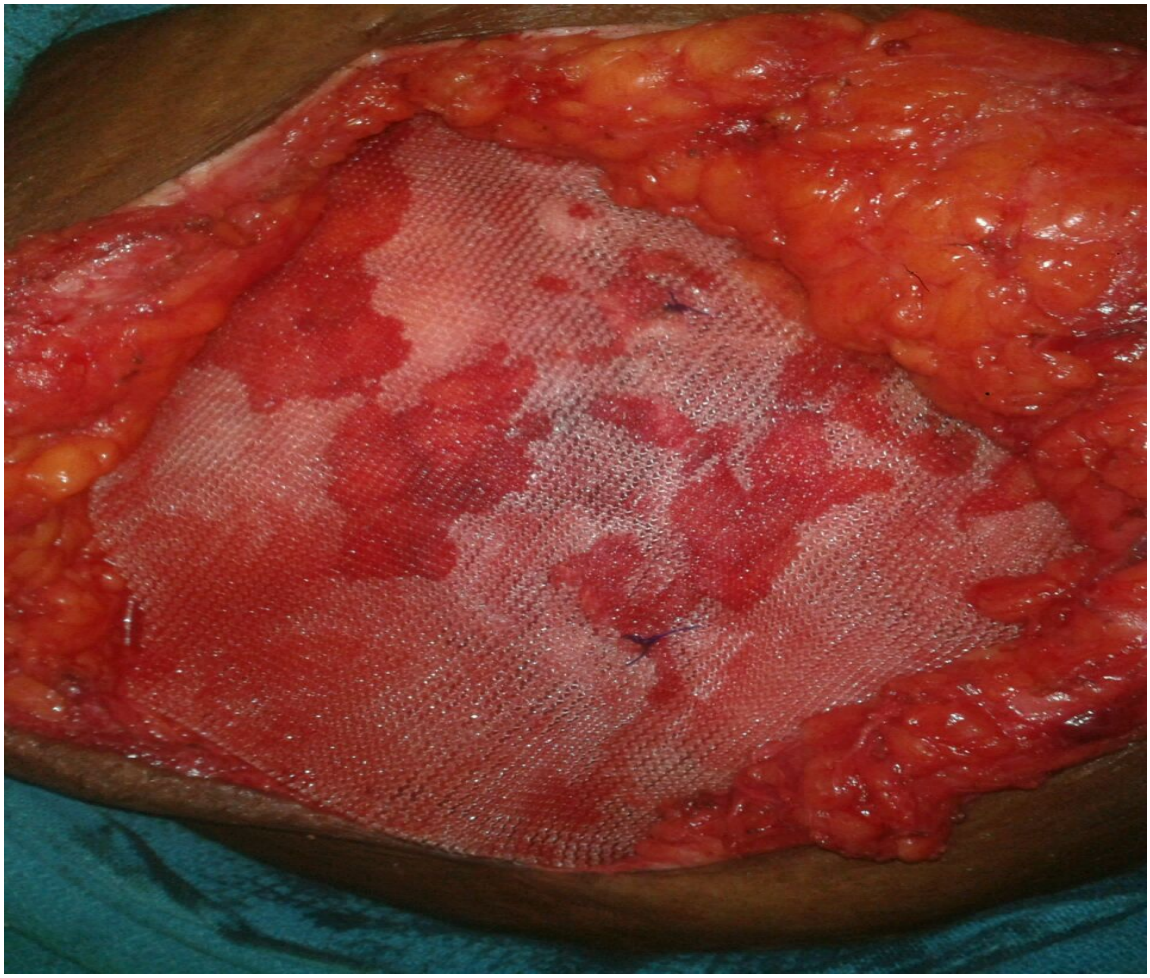
- Seromas
- Recurrences
- Wound infection
- Hematoma
- Prolonged bowel ileus
- Obstruction of bowel
- Adhesions.
- Respiratory compromise
- Thrombophlebitis
- Recurrences

POST OPERATIVE CARE:

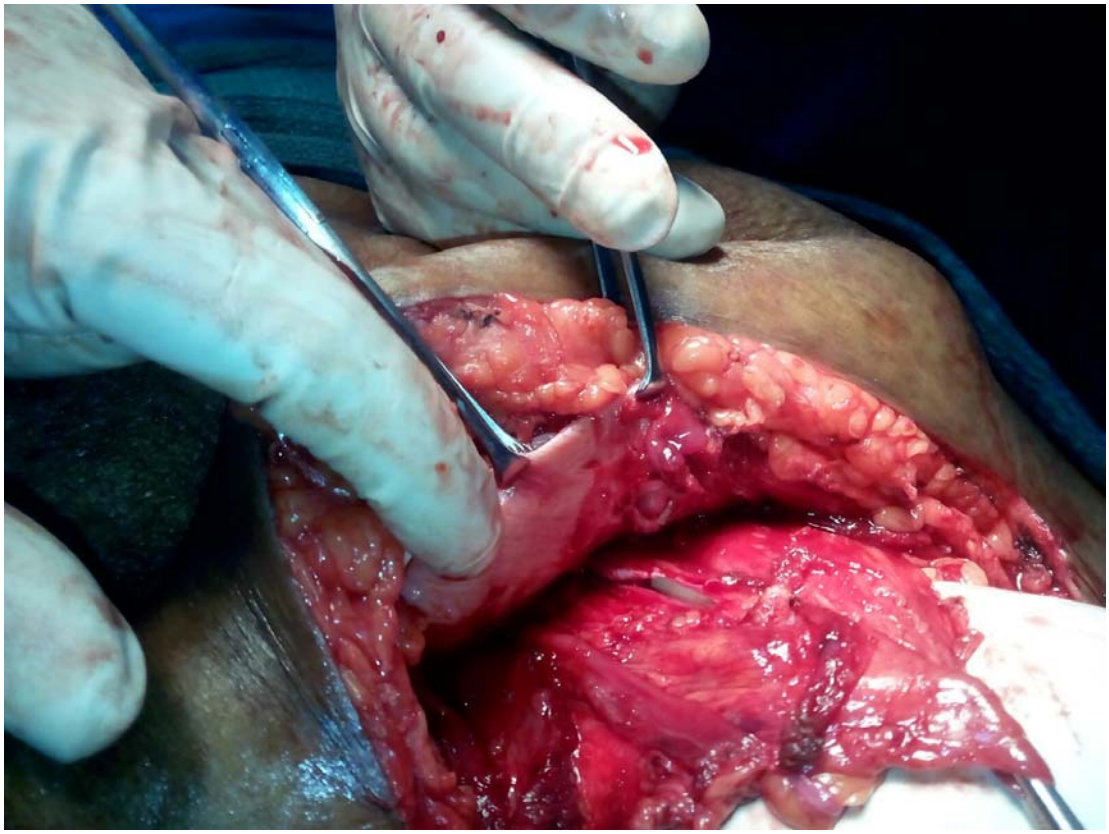
- 2hrly nasogastric tube was aspirated to decompress the stomach. Ryle's tube removed once patient passed flatus.
- Breathing exercises was started with Incentive spirometry.
- Adequate wound care and proper dressing of wound attended.
- Good hydration was status maintained.
- Early ambulation as soon as the patient pain reduced.
- Suction drain was in situ till it become <20 ml in 24 hrs.
- 3^{rd} generation cephalosporins given till removal of drain (min 5 days). Higherantibiotics instituted if and when needed.
- Patient was given laxatives to avoid straining.
- Skin sutures removed on 8^{th} -10^{th} day.
- Patient was advised to avoid heavy work for a period of 6 months.

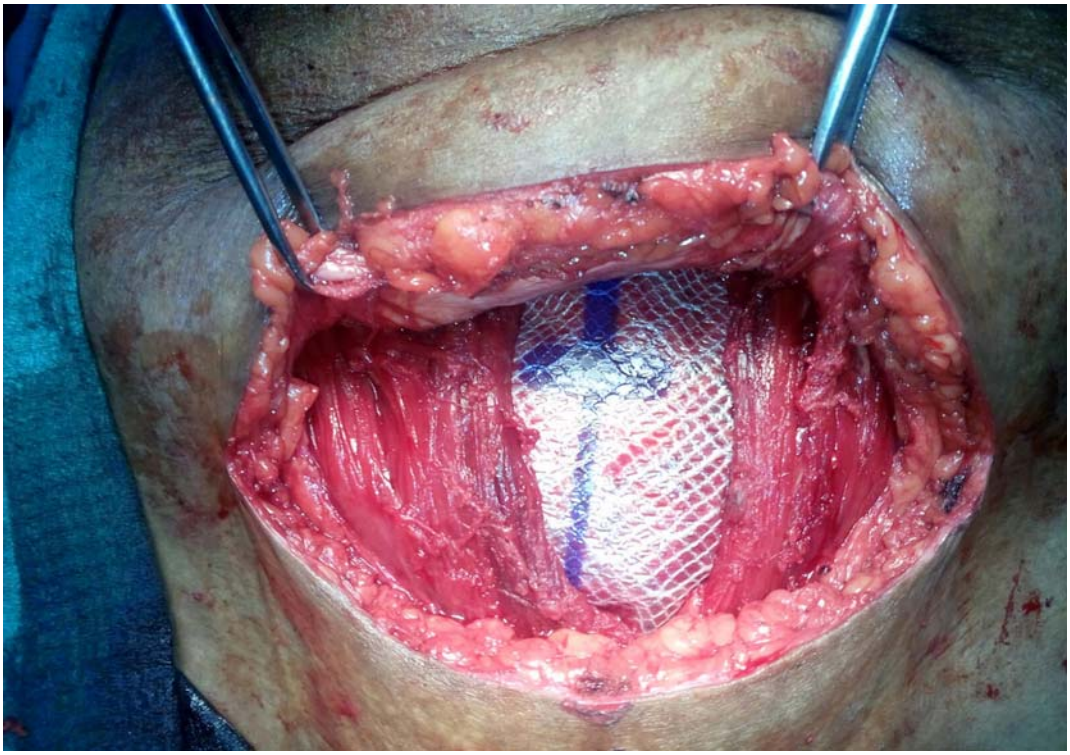
PER OPERATIVE PICTURES

ONLAY MESH REPAIR

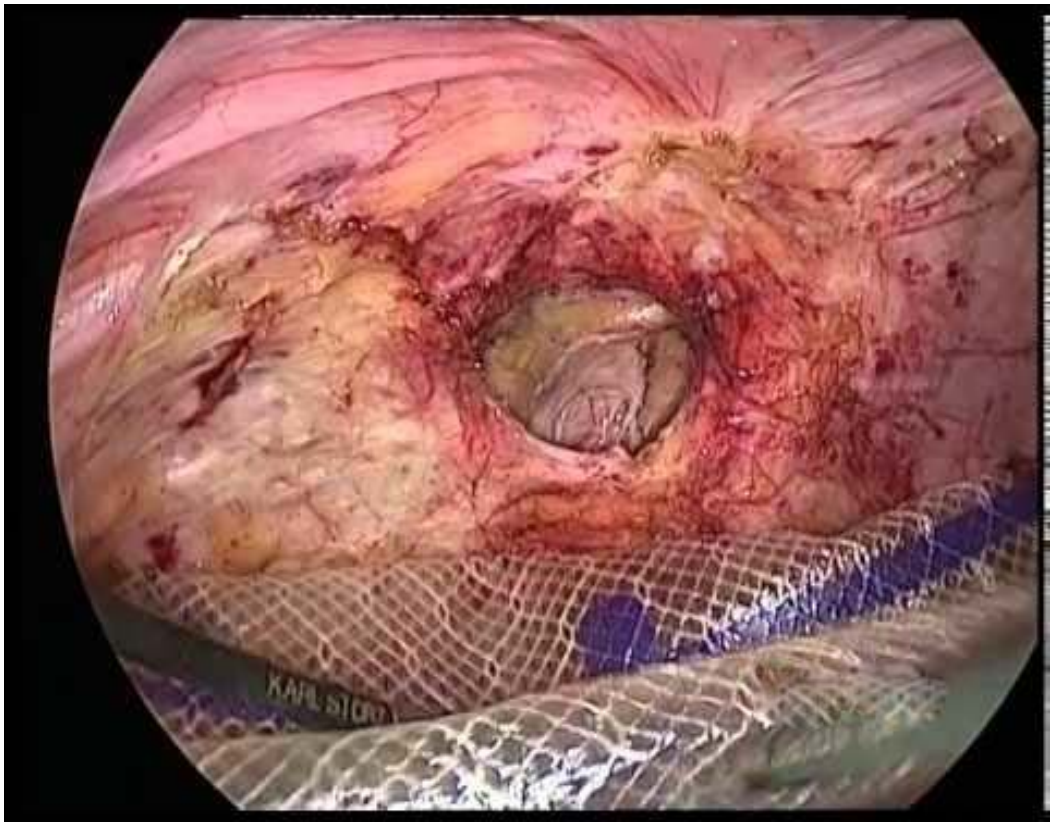


PREPERITONEAL MESH REPAIR





LAPAROSCOPIC MESH REPAIR



POST OPERATIVE PUCTURES

ONLAY MESH REPAIR:

PREPERITONEAL MESH REPAIR:

LAPAROSCOPIC MESH REPAIR:

TITLE

CLINICAL STUDY ON MANAGEMENT OF INCISIONAL HERNIA AND ITS OUTCOME

AIMS AND OBJECTIVES OF THE STUDY:

1.To study risk factors of incisional hernia

2.To study various surgical techniques

a.Onlay mesh repair

b.Preperitoneal/sublaymesh repair

c.laparoscopic mesh repair

3.To study post-operative complications.

MATERIALS AND METHODS

MATERIALS AND METHODS

SOURCE OF DATA:

Patients admitted inInstitute of General Surgery, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai.

STUDY PERIOD:

August 2015 to August 2016.

STUDY DESIGN:

Observational study-Prospective and retrospective

SAMPLE SIZE: 50 Patients

PLACE OF STUDY:

Rajiv Gandhi government general hospital,Chennai.

ETHICAL CLEARANCE:

Institutional ethical clearance obtained.

INCLUSION CRITERIA:

All patients between 20-70 years of age

EXCLUSION CRITERIA:

1.Recurrentincisioal hernias

2.strangulated and incarcerated incisional hernias

3.Incisional hernia during pregnancy

4.Patients with severe co morbidities(viz.,severe cardio-pulmonary disease)

DATA COLLECTION:

Data was collected by thorough pre structured questionnaire viz. history taking, clinical examination, investigations, collection of per operative and post operative complications, and follow up, after getting informed written consent from patient or from their legal guardian.

METHODOLOGY:

Patients who met inclusion and exclusion criteria for the study selected and all patients discussed about the nature of the disease and possible complications(post operative wound infection, wound gaping,seroma formation,recurrence etc)

- ❖ Written consent for the study and surgery obtained.
- ❖ In proforma, thorough history, signs and symptoms were recorded.
- ❖ Through clinical examination of physical signs was done.

INVESTIGATION DETAILS:

- Blood glucose and urea , Serum creatinine ,
- Complete Blood count, Urine routine examination,
- X ray chest PA view, ECG in all leads ,Echocardiography and pulmonary function tests performed pre operatively.
- PUS for culture and sensitivity,usg abdomen.
- High frequency usg done to find defect size and contents.

PRE OPERATIVE PREPARETIONS:

- Patient was kept on NPO 8 hrs before surgery,
- Informed written consent was obtained.
- Preparation of abdomen uptomid thigh was done.
- Thoracic and cardiac evalution done. Lungs were prepared.
- Glycemic status of the patient maintained in normal limits.
- Inj .Cefotaxime 1gm IV before surgery.
- Inj. Ranitidine 50 mg IV before surgery
- Inj. TT 0.5 cc IM
- Inj. Linocaine test dose.

PROCEDURE DONE:

Patients are randomly selected for

- ❖ Onlay mesh repair
- ❖ Preperitoneal/sublay mesh repair
- ❖ Laparoscopic mesh repair.

In our study a total of 50 patients were studied randomized to Onlay(18), preperitoneal mesh repair(16) and laparoscopic mesh repair (16).

Onlay and preperitoneal mesh repair was done under either epidural or spinal anaesthesia.

Laparoscopic mesh repair was done under general anaesthesia.

TYPE OF MESH USED:

Onlay – polypropylene mesh of appropriate size

Preperitoneal/ sublay mesh repair –kugel mesh / polypropylene mesh of appropriate size

Laparoscopic mesh repair – Composite mesh (ePTFE) used.

Standard surgical techniques was implemented.

POST OPERATIVE EVENTS:

Patient shifted to post operative ward and given adequate analgesics and antibiotics. Oral fluids were started after patient passed flatus. Abdominal binder was advised. DT was removed once drain become less than 30 ml over 24 hrs. if patients improved clinically,they were discharged and advised attend surgical OPD for follow up.

ASSESSMENT SHEET

RISK FACTORS FOR INCISIONAL HERNIA:

1) Age & sex

2) Obesity (BMI > 30)

3) DM

4) Previous surgery

5) Type of incision

POST OPERATIVE COMPLICATIONS:

1) Seroma formation

2) Wound infection

3) Drainage time.

4) Pain

5) Length of hospital stay

6) Recurrence.

STATISTICAL ANALYSIS:

Data analysis was done both manually and by using computer. Calculated data was arranged in systemic manner and presented in various table and figures. Statistical analysis wasdone. Results on continuous measurements are presented as Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5% level of significance. Chi-square test has been used to find the significance of study parameters on categorical scale between two or more groups.

SIGNIFICANT FIGURES:

- Suggestive significance (P value: $0.05<P<0.10$)
- Moderately significant (P value: $0.01<P<0.05$)
- Strongly significant (P value: $P\leq0.01$)

STATISTICAL SOFTWARE:

The statistical software namely SAS 9.2, SPSS 15.0, Stats 10.1, MedCalc 9.0.1, Systat 12.0 and R environment ver.2.11.1 were used for the analysis of data and Microsoft Word and Microsoft Excel have been used to generate graphs, tables, etc.

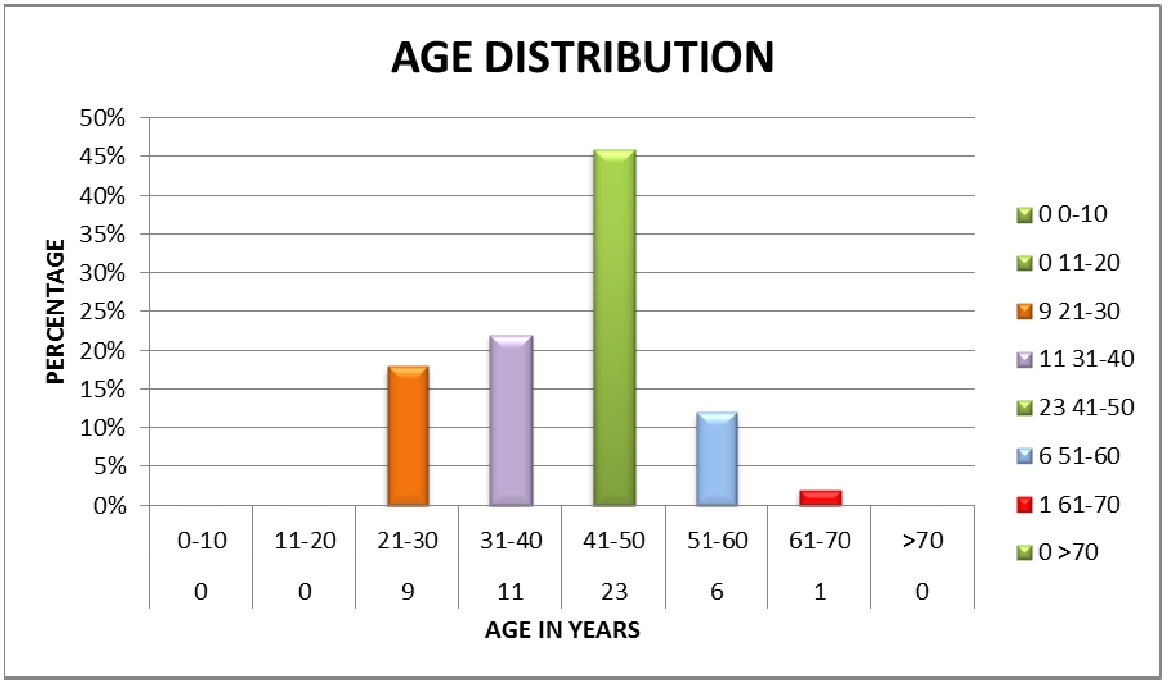
OBSERVATION AND ANALYSIS OF RESULTS

OBSERVATION AND ANALYSIS OF RESULTS

The study **"CLINICAL STUDY ON MANAGEMENT OF INCISIONAL HERNIA AND ITS OUTCOME"** has been done in Institute of General Surgery, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai. The following observations were made:

1.AGE DISTRIBUTION:

AGE DIFFERENCE	NO. OF PATIENTS	PERCENTAGE
0-10	0	0%
11-20	0	0%
21-30	9	18%
31-40	11	22%
41-50	23	46%
51-60	6	12%
61-70	1	1/50
>70	0	0%

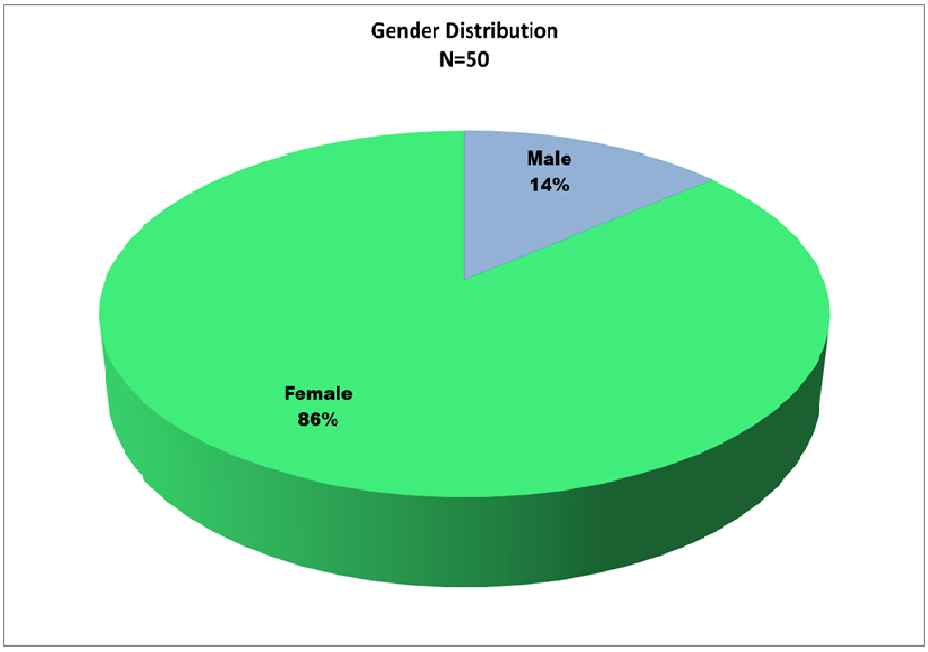


In our study incidence of incisional hernia is maximum in 5thdecade,about 46%. incidense between 30-50 years constitute about 68% of patients.

In our study , Incidence is nil in patients <20years and >70 years.

2. GENDER DISTRIBUTION:

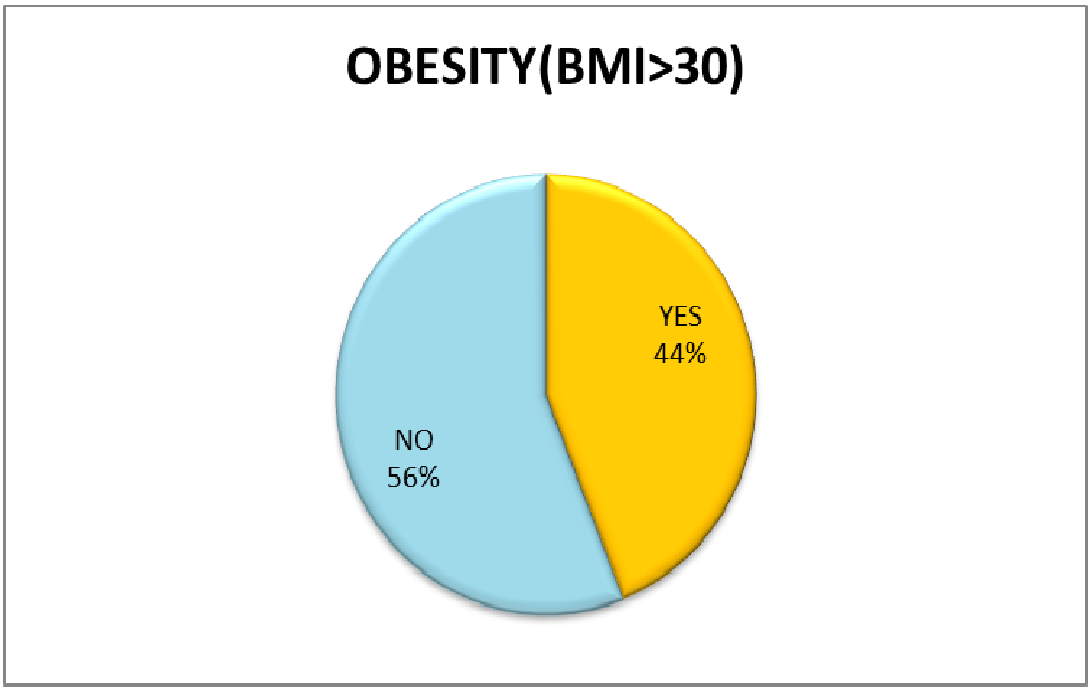
GENDER	NO. OF PATIENTS	PERCENTAGE
Male	7	14.0%
Female	43	86.0%
Total	**50**	**100.0%**



In our study of 50 cases, incidence of incisional hernia is more common in females than males. About 86% patients are female (42/50),compared to 14% in males(7/50). Female to male ratio is 6:1.

3.OBESITY:

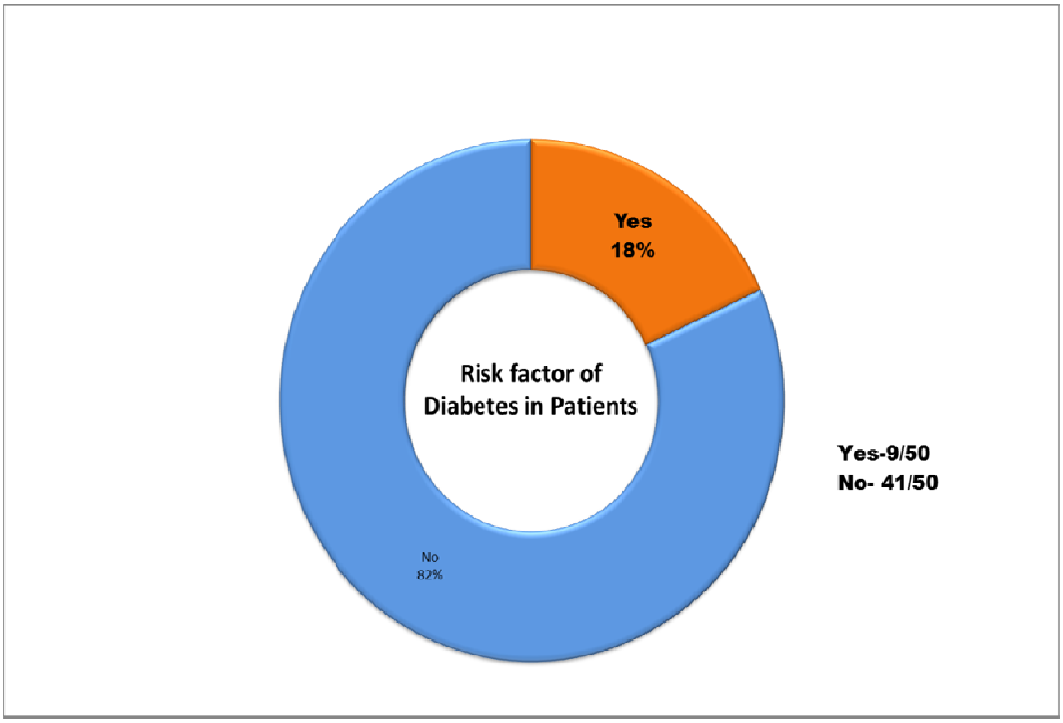
	YES	NO	TOTAL
OBESITY(BMI>30)	22	28	50
PERCENTAGE	44%	56%	100%



In our study, about 44% of patients presented with incisional hernia are obese(BMI >30).

4.DIABETES:

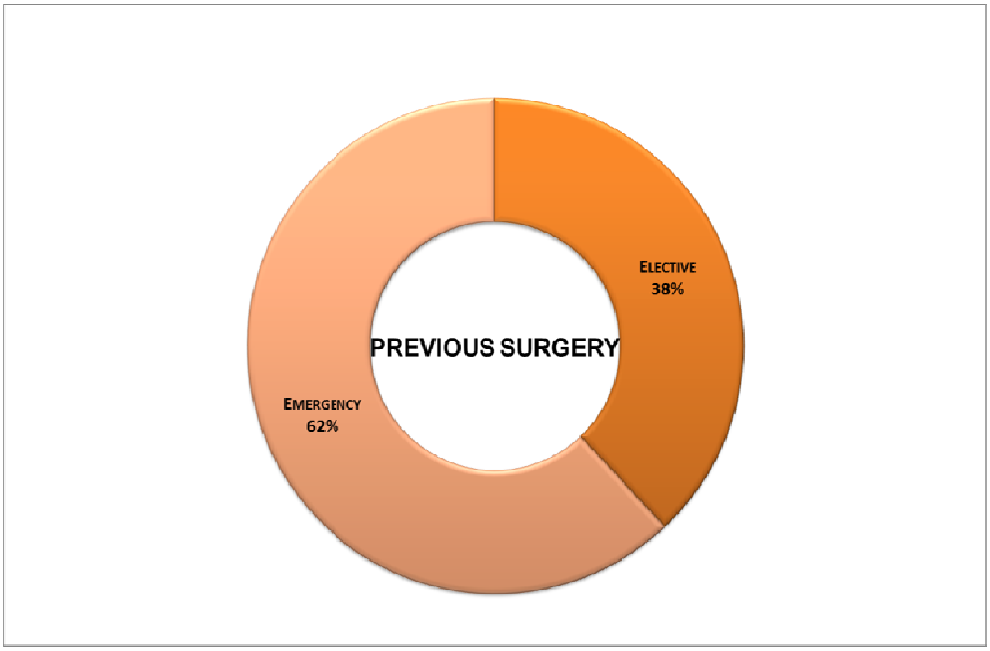
DIABETES	NO. OF PATIENTS	PERCENTAGE
Yes	9	18.0%
No	41	82.0%
Total	**50**	**100.0%**



In our study about 18% of patients are diabetics(9/50).

5.PREVIOUS SURGERY:

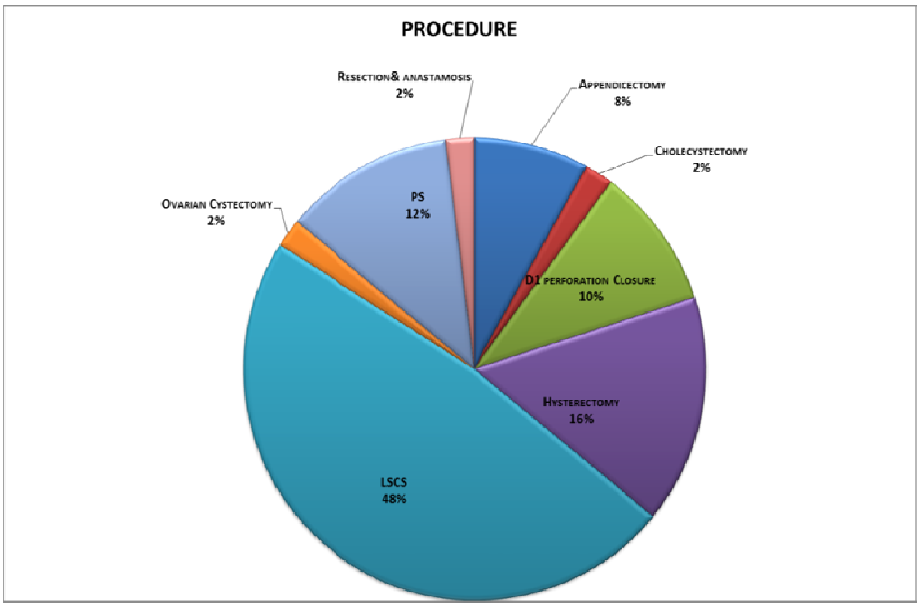
PREVIOUS SURGERY	PATIENTS	PERCENTAGE
Elective	19	38.0%
Emergency	31	62.0%
Total	**50**	**100.0%**



In our study, incidence of incisional hernia is more common after emergency surgery (31/50) constitutes about 62% of patients

6.TYPE OF SURGERY:

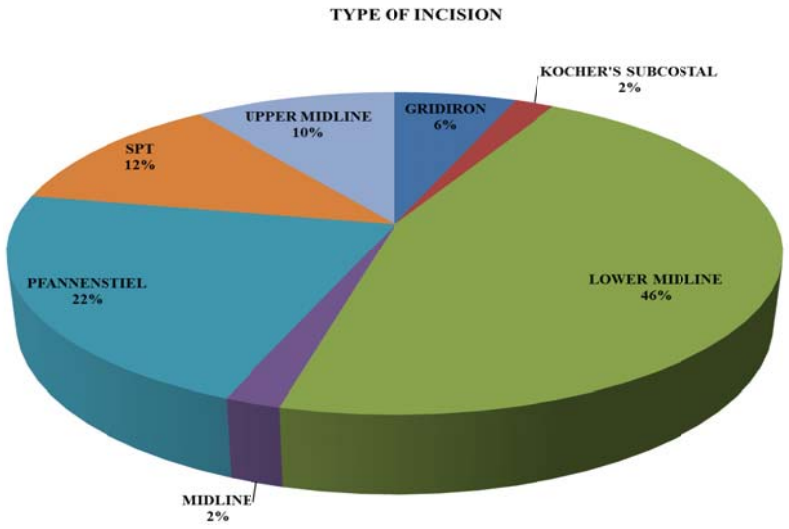
NATURE OF SURGERY	NO.OF PATIENTS	PERCENTAGE
Appendicectomy	4	8.0%
Cholecystectomy	1	2.0%
D1 Perforation Closure	5	10.0%
Hysterectomy	8	16.0%
LSCS	24	48.0%
Ovarian Cystectomy	1	2.0%
PS	6	12.0%
Resection & Anastamosis	1	2.0%
Total	**50**	**100.0%**



In our study, incidence of incional hernia is more often followed by gynaecological procedure, about 78% of patients. Among them LSCS was the commonest cause followed by hysterectomy. Gastro intestinal surgeries account for about 14%.

7.TYPE OF INCISION:

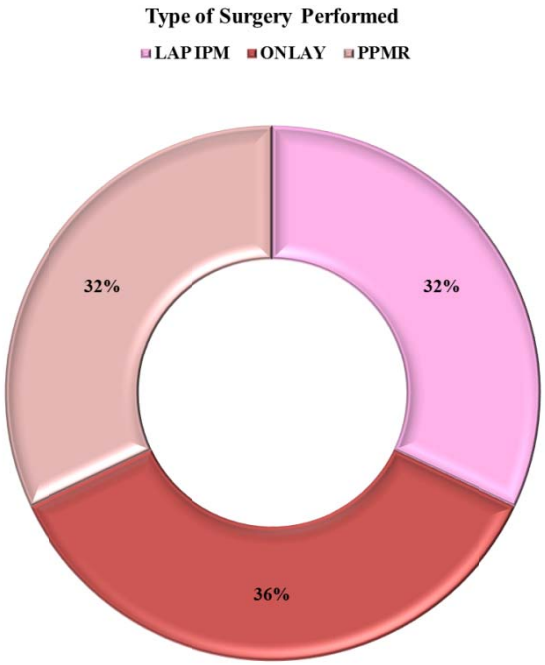
TYPE OF INCISION	NO. OF PATIENTS	PERCENTAGE
GRIDIRON	3	6.0%
KOCHER'S SUBCOSTAL	1	2.0%
LOWER MIDLINE	23	46.0%
MIDLINE	1	2.0%
PFANNENSTIEL	11	22.0%
SPT	6	12.0%
UPPER MIDLINE	5	10.0%
Total	**50**	**100.0%**



In our study, incional hernia is more common if patients had previous operations using lower midline incisions (46%), other incisions are pfannenstiel, upper midline, McBurney's and transverse incisions.

TYPE OF SURGERY PERFORMED:

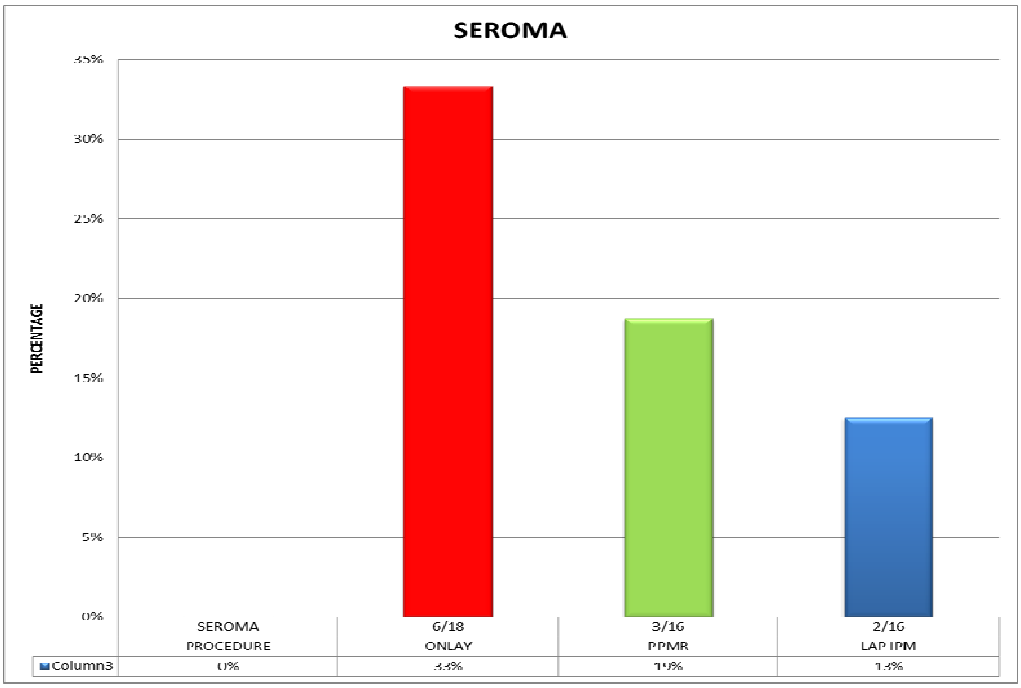
Of 50 patients 18 undegoonlay mesh repair, whereas in PPMR and LAP Mesh repair it is 16 each.



POST OPERATIVE STATUS

1.SEROMA FORMATION:

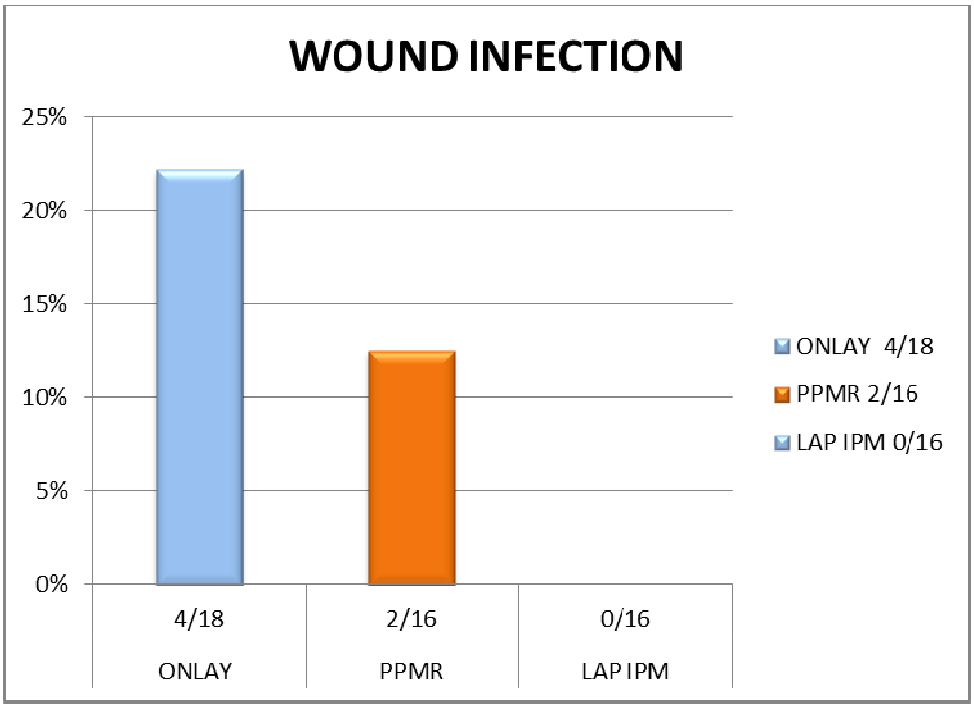
PROCEDURE	NO. OF PATIENTS	PERCENTAGE
ONLAY	**6/18**	**33%**
PPMR	3/16	19%
LAP IPM	2/16	13%



Of 50 patients studied, seroma formation more in onlaygroup(6/18) about 33.33%. in PPMR(3/16) and LAP(2/16) mesh repair it is 18.75% and 12.5% respectively.

2.WOUND INFECTION:

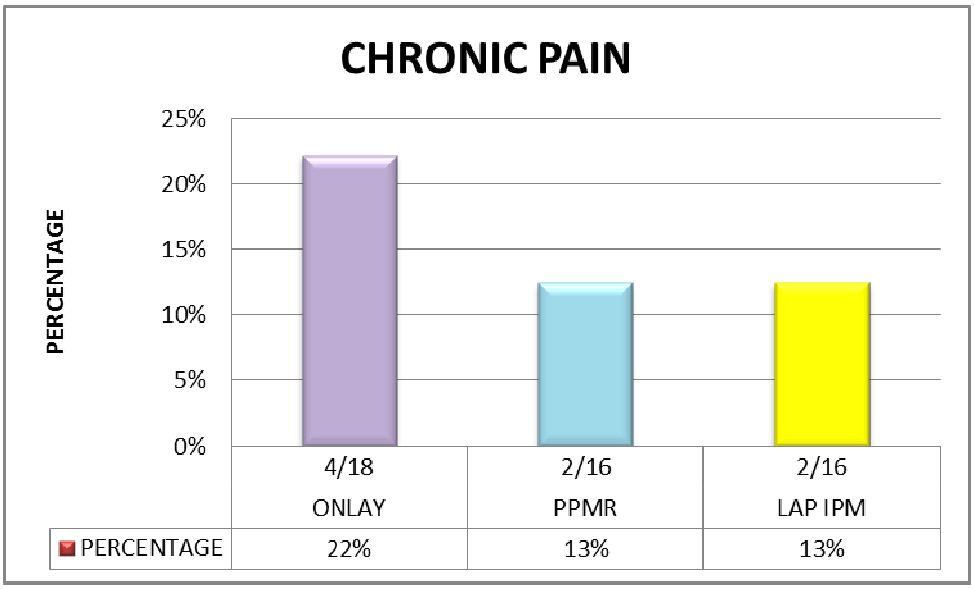
PROCEDURE	NO. OF PATIENTS	PERCENTAGE
ONLAY	4/18	22%
PPMR	2/16	13%
LAP IPM	0/16	0%



In our study wound infection is more common after onlay mesh pair(4/18) about 22.22% than PPMR(2/16), 12.5%. In laparoscopic group there was no incidence.

3.CHRONIC PAIN:

PROCEDURE	NO. OF PATIENTS	PERCENTAGE
ONLAY	4/18	22%
PPMR	2/16	13%
LAP IPM	2/16	13%

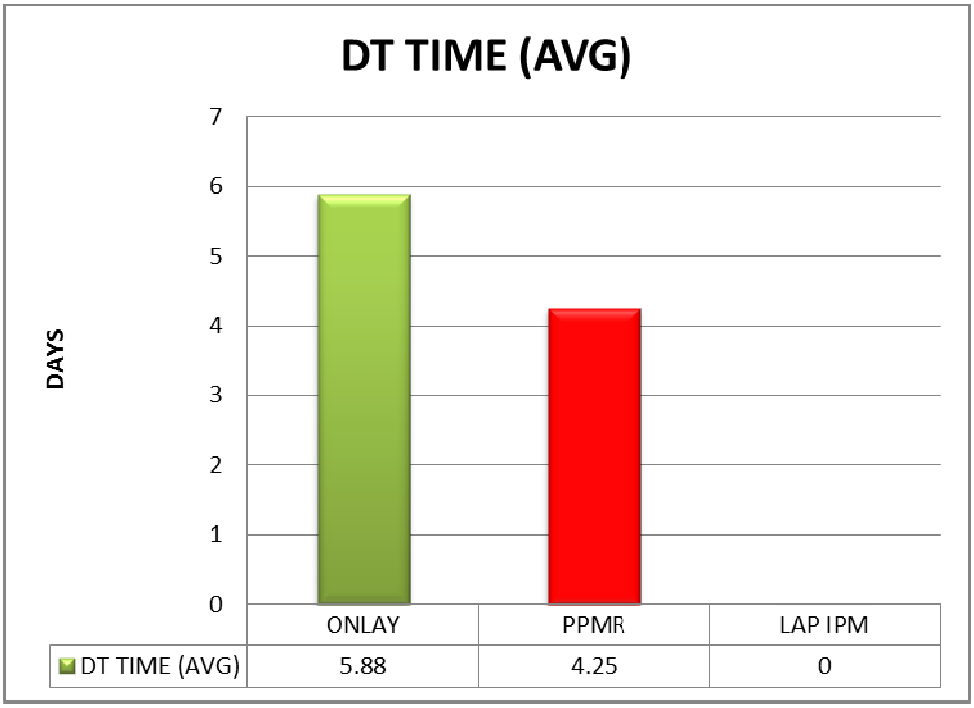


In our study, chronic pain (> 2 weeks) , more in onlay mesh repair group (22%).

In PPMR and in Laparoscopicgroup it is 13% each.

4.DRAINAGE TIME:

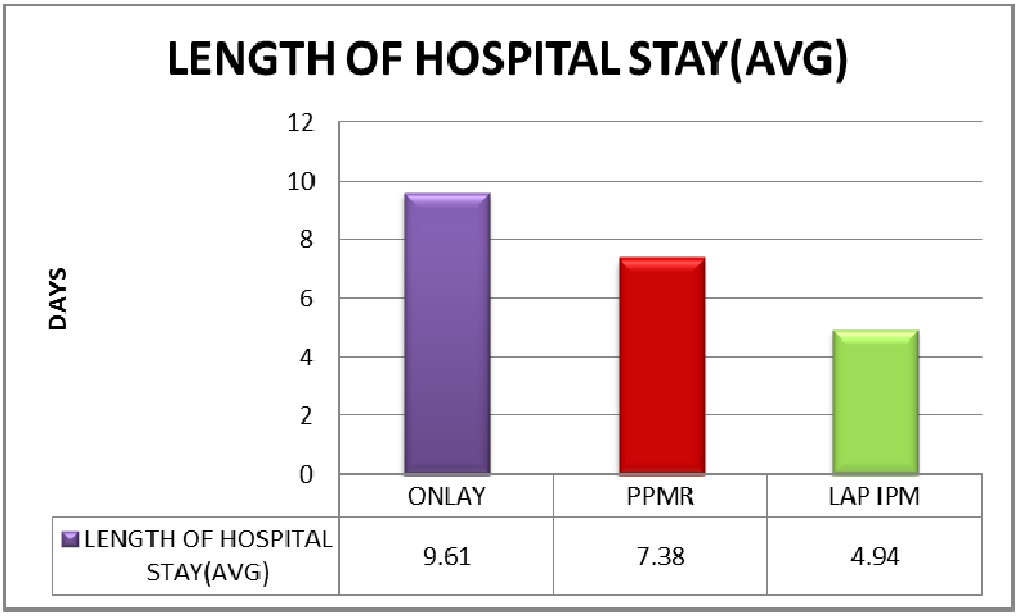
PROCEDURE	AVG DAYS
ONLAY	5.88
PPMR	4.25
LAP IPM	0



In our study of 50 patients mean DT time in onlay group is 5.88 days and in PPMR group is 4.25 days. DT was not kept in case of laparoscopic group.

5.LENGTH OF HOSPITAL STAY:

PROCEDURE	AVERAGE DAYS
ONLAY	9.61
PPMR	7.38
LAP IPM	4.94



In our study, mean length of hospital stay was more in onlay group is about 9.61 days. In PPMR and Laparoscopic group it is 7.38 days and 4.94 days respectively.

6.RECURRENCES:

In this study comprising 50 patients,there was no short term recurrences (3 months) observed.

STATISTICAL ANALYSIS

Statistical analysis was done by Chi- square tests, while comparing variables of the results obtained. 'P'value calculated and compared in consultation with statistician.

POST OP STATUS:

SEROMA VS TYPE OF SURGERY PERFORMED

POST OP STATUS-Seroma		**TYPE OF SURGERY PERFORMED**				**P-value**
		LAP IPM	**ONLAY**	**PPMR**	**Total**	
	N	14	12	13	39	
	Y	2	6	3	11	0.319(NS)
Total		16	18	16	50	

WOUND INFECTION VSTYPE OF SURGERY PERFORMED

WOUND INFECTION		**TYPE OF SURGERY PERFORMED**				**P-value**
		LAP IPM	**ONLAY**	**PPMR**	**Total**	
	N	16	14	15	45	
	Y	0	4	1	5	0.081(NS)
Total		16	18	16	50	

DRAINAGE TIME VSTYPE OF SURGERY PERFORMED

Drainage time		TYPE OF SURGERY PERFORMED			Total	P-value
		LAP IPM	ONLAY	PPMR		
	<5days	0	1	11	12	
	>5 days	0	17	5	22	**0.0001(S)**
	NIL	16	0	0	16	
Total		16	18	16	50	

CHRONIC PAIN VSTYPE OF SURGERY PERFORMED

CHRONIC PAIN	TYPE OF SURGERY PERFORMED			Total	P-value
	LAP IPM	ONLAY	PPMR		
N	14	14	14	42	
Y	2	4	2	8	0.667(NS)
Total	16	18	16	50	

Hospital Stay VS TYPE OF SURGERY PERFORMED

Hospital stay		TYPE OF SURGERY PERFORMED				P-value
		LAP IPM	ONLAY	PPMR	Total	
	<5days	7	0	0	7	
	5-10days	9	11	14	34	**0.0001(S)**
	>10days	0	7	2	9	
Total		16	18	16	50	

POST OPERATIVE COMPLICATION:

Post Opstatus	Onlay	PPMR	Laparoscopic	P Value
Seroma	33% (6/18)	18.75% (3/16)	12.5% (2/16)	0.319 (NS)
Wound Infection	22.22% (4/18)	12.5% (2/16)	NIL	0.081 (NS)
AVG.Drainage Time (Days)	5.88	4.25	NIL	0.0001 (S)
Chronic Pain (>2 Weeks)	22.22% (4/18)	12.5% (2/16)	12.5% (2/16)	0.667 (NS)
AVG. Length of Hospital Stay (Days)	9.61	7.38	4.94	0.0001 (S)
Recurrence	Nil	Nil	Nil	Nil

DISCUSSION

DISCUSSION

Hernia in previous surgical sit e is a common complication following abdominal surgery, incidence varies from 2-11%. Out of 50 cases were studied about 46% of patients are in age group 41-50 with mean age of incidence is 41.6 years which is comparable to Maingot's studies where mean age is 45 years. In our study youngest patient is 24 years and oldest was 61 years.

In our study of 50 patients, 86% female were females with female to male ratio is 6:1 approximately. Most larger studies showed the incidence is about 3-4: 1. In a study by Goel and Dubey have 1:1.25 (F:M) ratio. In Bhutiawt et al study F:M ratio was 3:1.5 with 84% female preponderance.

Obesity, diabetes and wound infection of index surgery are most important risk factor for incisional hernia to develop. Others beinganemia, factors increasing intra abdominal pressure, smokers, hypoproteinemia. In our study comparing 50 patients, 44% of patients are obese, mostly females. Increased incidence of incisional hernia in obese female can attributed to lax abdominal wall musculature following multiple pregnancies. Studies by Bose et al and weber et al showed 30% of patients are obese. In our study, diabetes is a risk factor in about 18%

of patients comparable with studies by Rios et al and Weber et al, about 18% and 23% respectively.

In our study comprising 50 patients, Gynaecological procedures (LSCS, Hysterectomy, puerperal sterilisation) are major cause,constitute about 78%. 22% patients from other procedure mostly following gastro intestinal surgeries.

Among gynaecological procedure, LSCS (48%), hysterectomy (16%) and tubectomy (12%). Among GIT Surgeries, surgeries done via upper midline, following perforation(10%) was the commonest cause. Most of patients presented, incision for previous surgery were lower midline about 46% followed by pfannensteil incision(22%) for LSCS, transverse incision(12%), upper midline incision(10%), Mc Burney's incision(6%). In Ponka study, incidence following lower midline incision was 36% which is the commonest predisposing factor.

Post operative complication studied are seroma formation, wound infection, chronic pain (>2 weeks), Drainage time, length of hospital stay and short term recurrence(3 months).

Seroma formation is common complication following incisional hernia repair. Seroma formation was more in Onlay group (33.33%) than PPMR group (18.75%) and Laparoscopic group(12.5%). In Machiaras et

al, seroma formation for onlay group is 14%. In most studies, seromas much lower in preperitoneal / Sublay group than onlay mesh repair. In laparoscopic its incidence is much lesser.

Onlay mesh repair results in higher rate of wound infection than other groups, its incidence being 6-12%. In our incidence is 22.22% , 12.5% and 0% for onlay, Preperitoneal and Laparoscopic group. Most of them managed conservatively with few in onlay group requiring wound debridement and secondary suturing. No patients required removal of mesh.In other studies, incidence of wound infection for preperitoneal is much lesser about 2-4%.Milad&collegues reported sublay technique aasocoiated with low incidence of wound infection. In Laparoscopic group there was no incidence of wound infection in our study compared to <1% in other studies.

Incidence of chronic pain is 22.22%, 12.5%, 12.5% in onlay, Preperitoneal and Laparoscopic group respectively. In our study, incidence was much higher for laparoscopic group than other studies, because transfascial sutures placed and small no. of patients were studied. Limiting the number of transfascial sutures significantly reduces pain at surgical site.

Drainage time is time interval between day of surgery to the day the drain was removed. Mean drainage time for onlay, preperitoneal and

laparoscopic mesh repair are 5.88days, 4.25 days, 0 days for onlay, preperitoneal and laparoscopic mesh repair group. In laparoscopic group DT was not needed, adding quicker recovery and earlier return to daily activities. Drainage amount and period was shorter in preperitoneal group when compared to onlay mesh repair group.

Length of hospital stay is from day of surgery today the patient clinically fit for discharge. Mean hospital stay was 9.61 days, 7.38 days and 4.94 days for onlay, preperitoneal and laparoscopic mesh repair which is comparable to other studies. In de Vries Reilingh et al and Gleysteen study it is 8.2 days and 6.1 days for onlay, and it is 6.1 days and 5.9 days for preperitoneal group respectively.

In our study there was no recurrences observed in any group. Most of the studies showed recurrence rate between 1-4%. No recurrence may be because of short duration of follow up and small no. of patients studied.

LIMITATIONS OF THE STUDY:

Major limitation of the study is small sample size compared within the limited period of time. All the procedure was done at single surgical centre, where the application of its results to all need further research studies. Follow up period is only 3 months, so result of the recurrence rate of this study neede further follow up to compare with the larger studies. all the results arrived by this study may not be comparable to large series of studies, but still this study was done in government tertiary hospital in our country, it results have some credential in enumerating better surgical procedure in respect to short term complication rather than long term recurrences, to have better patient outcome.

SUMMARY

Incisional hernia is second most common hernia following inguinal hernia. Inspite of various available technique available in mesh repair, none of them is the best, each having its own complication. This study of "**CLINICAL STUDY ON MANAGEMENT OF INCISIONAL HERNIA AND ITS OUTCOME**" to study various techniques in respect to its post operative complication. This study was carried in **Madras Medical College - Rajiv Gandhi Government General Hospital, Chennai**.

A total of 50 patients were studied. Observations of this study are summarized as follows:

Mean age of presentation of incisional hernia is 41.6 years with majority of patients in age group of 41-50.

Incisional hernia more common in females, about 86% of female preponderance with female to male ratio 6:1.

Obesity and diabetes are the major risk factor for incisional hernia. About 18% of patients are diabetics and 44% patients are obese in our study.

In our study, Surgery done under emergency situations (62%) are more likely to result in incisional hernia than elective surgeries(38%).

Previous surgery plays an important risk factor for development of incisional hernia, gynaecological procedure alone constitute about 78% of patients mostly following LSCS (48%).

In our study, incisional hernia is most common following lower midline incision about 46%, act as a major risk factor owing to lack of posterior rectus sheath below the arcuate line. Other incision being pfanensteil incision, transverse incision, McBurney's incision, upper midline, kocher's incision.

In post operative complication seroma formation (33.33%), wound infection (22.22%) and chronic pain (22.22%) more common in Onlay mesh repair group than Preperitoneal group 18.75%, 12.5%, 12.5 % and Laparoscopic group 12.5%, 0%, 12.5% respectively.

The Mean Drainage time is more in Onlay group (5.88 days) than Preperitoneal group (4.25 days). In laparoscopic group DT was not kept.

The Mean Length of hospital stay is shorter in laparoscopic group (4.94 days) when compared to onlay (9.61 days)group and preperitoneal (7.38 days) group.

The was no recurrences found in short duration of 3 months in any of the group.

CONCLUSION:

This prospective and retrospective observational study was conducted in Institute of General Surgery, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai, from August 2015 to AUGUST 2016. Incidence of incisional hernia is common among females, most of them in 4^{th} to 5^{th} decade. Use of midline incision had resulted in majority of incisional hernia, so should be restricted to situations where it is inevitable. Control of obesity and diabetes plays a major role in post op wound healing and may reduces incisional hernia incidence. Among various surgical techniques, laparoscopic mesh repair prove to be better technique than open procedure in terms of complications and duration of hospital stay, should be considered whenever feasible. But major disadvantage is high cost and more learning curve. In open mesh repair, preperitoneal layer is ideal position of placing the mesh as it is associated with less complication than onlay repair , earlier return to work and better prognosis.

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ANNEXURES

PROFORMA

Name: I.P.NO.:

AGE : D.O.A.:

SEX :D.O.D.:

D.O.O:

RELIGION :

OCCUPATION :

RESIDENCE :

CHIEF COMPLAINTS :

Swelling

Pain

Other complaints

HISTORY OF PRESENTING ILLNESS :

Swelling : Duration

Site

TimeofOnset

Progression

Reducible / Irreducible

History suggestive of any complications

Pain : DURATION

NATURE – Dragging / Colicky / Dull aching

INTENSITY – Mild / Severe

SITE – Local / Generalised

History of risk factors like Chronic Cough / Constipation / Difficulty in passingurine etc. in post operative period.

HISTORY OF SURGERY :

- Duration since Surgery / Date.
- Where performed.
- Whether Emergency / Elective
- Any post operative complication – Infection / Dehiscence / Repeat Surgery /
- Type of surgery
- Duration of stay after surgery
- Type of incision
- Any past H/o-DM / HTN / TB / Jaundice.

TREATMENT HISTORY :

History of Drug intake - Class of drug

- Duration of Drug intake

PERSONAL HISTORY:

Obesity -

Adverse social habits(if any) -

FAMILY HISTORY :

MENSTRUAL HISTORY :

GENERAL PHYSICAL EXAMINATION :

Pallor / Jaundice / Malnutrition / Obesity / Lymphadenopathy / Clubbing / Cyanosis / Built of the patient

VITAL SIGNS :

Pulse : /min. B.P. : mm of Hg.

Temp: Febrile / Afebrile Weight :

LOCAL EXAMINATION :

Inspection of swelling :

Size / Shape / Position and Extent –

Impulse on coughing

Scars

Skin over the swelling

Reducibility on lying down

External Hernial orifices

Tone of Abdominal Muscle Weak / Strong

Palpation of the swelling :

Local rise in temperature / Tenderness

Size / Shape / Position and Extent

Contents of the swelling

Width and length of Hernial defect

Reducibility

Any other mass

External Genitalia

Percussion :

Note over swelling – Resonant / Dull

Auscultation :

Bowel Sounds

SYSTEM EXAMINATION :

CVS :

R/S : Any evidence of COPD

CNS :

P/R : (Males) BPH : Yes / No

PROVISIONAL DIAGNOSIS :

INVESTIGATIONS :

Hb : gm/dl TLC : cells/cu.mm

DLC : N: L: E: M: B: ESR : mm at 1 hr.

Blood grouping and Rh typing :

Urine routine, Alb: Sug: Microscopy:

RBS: mg/dl. B. Urea: mg/dl. S. Cretinine: mg/dl.

Lipid Profile (if done)

Echocardiogram :

Chest X-Ray

Ultrasonography of Abdomen

HIV

TREATMENT GIVEN :

Type of surgery performed : onlayMesh/pre peritoneal mesh/laparoscopic

Type of Anaesthesia :GA/EPI-GA/RA/LA.

Type of Incision made :

Technique of operation :

Closure :

ஆய்வு ஒப்புதல் படிவம்

ஆய்வின் தலைப்பு

ராஜீவ் காந்தி அரசு பொது மருத்துவமனையில் இன்சிசனல் ஹெர்னியா (முந்தைய அறுவை சிகிச்சையினால் ஏற்படும் குடலிறக்கம்) நோய்க்கான காரணிகளையும் அதற்கு அளிக்கப்படும் பல்வேறு அறுவை சிகிச்சை முறைகள் பற்றிய ஆய்வு

ஆய்வு நிலையம் : பொது அறுவை சிகிச்சைத்துறை, ராஜீவ் காந்தி அரசு பொது மருத்துவமனை, சென்னை மருத்துவக் கல்லூரி சென்னை – 3.

பங்கு பெறுவரின் பெயர் :

பங்குபெறுபவரின் எண் :

பங்குபெறுபவர் இதனை (✓) குறிக்கவும்

..... என்பவராகிய நான் இந்த ஆய்வின் விவரங்கலும் அதன் நோக்கங்களும் முழுமையாக அறிந்துகொண்டேன். எனது சந்தேகங்கள் அனைத்திற்கும் தகுந்த விளக்கம் அளிக்கப்பட்டது. இந்த ஆய்வில் முழு சுதந்திரத்துடன் மற்றும் சுய நினைவுடன் பங்குகொள்ள சம்மதிக்கிறேன். ☐

எனக்கு விளக்கப்பட்ட விஷயங்களை நான் புரிந்துகொண்டு நான் எனது சம்மதத்தை தெரிவிக்கிறேன். இச்சுய ஒப்புதல் படிவத்தை பற்றி எனக்கு விளக்கப்பட்டது. ☐

இந்த ஆய்வினை பற்றிய அனைத்து தகவல்களும் எனக்கு தெரிவிக்கப்பட்டது. இந்த ஆய்வில் எனது உரிமை மற்றும் பங்கினை பற்றி அறிந்துகொண்டேன். ☐

இந்த ஆய்வில் பிறரின் நிர்பந்தமின்றி என் சொந்த விருப்பத்தின்பேரில் தான் பங்கு பெறுகிறேன் மற்றும் நான் இந்த ஆராய்ச்சியிலிருந்து எந்நேரமும் பின்வாங்கலாம் என்பதையும் அதனால் எந்த பாதிப்பும் ஏற்படாது என்பதையும் நான் புரிந்துகொண்டேன். ☐

இந்த ஆய்வில் கலந்துகொள்வதன் மூலம் என்னிடம் பெறப்படும் தகவலை ஆய்வாளர் இன்ஸ்டிட்யூசனல் எத்திக்ஸ் கமிட்டியினரிடமோ, அரசு நிறுவனத்திடமோ தேவைப்பட்டால் பகிர்ந்துகொள்ளலாம் என சம்மதிக்கிறேன். ☐

இந்த ஆய்வின் முடிவுகளை வெளியிடும்போது எனது பெயரையோ, அடையாளங்களையோ வெளியிடப்படாது என அறிந்துகொண்டேன். இந்த ஆய்வின் விவரங்களைக் கொண்ட தகவல் தாளைப் பெற்றுக்கொண்டேன். இந்த ஆய்விற்காக இரத்தப் பரிசோதனை செய்துகொள்ள சம்மதிக்கிறேன். ☐

இந்த ஆய்வில் பங்கேற்கும் பொழுது ஏதேனும் சந்தேகம் ஏற்பட்டால், உடனே ஆய்வாளரை தொடர்புகொள்ள வேண்டும் என அறிந்துகொண்டேன். ☐

இந்த ஆய்வில் எனக்கு மருத்துவ பரிசோதனை, இரத்தப் பரிசோதனை மற்றும் இதய உட்பு ஆய்வு பரிசோதனை செய்துகொள்ள முழு மனதுடன் சம்மதிக்கிறேன். ☐

இச்சுய ஒப்புதல் படிவத்தில் கையெழுத்திடுவதன் மூலம் இதிலுள்ள அனைத்து விஷயங்களும் எனக்கு தெளிவாக விளக்கப்பட்டது என்று தெரிவிக்கிறேன் என்று புரிந்துகொண்டேன். இச்சுய ஒப்புதல் படிவத்தின் ஒரு நகல் எனக்கு கொடுக்கப்படும் என்று தெரிந்துகொண்டேன்.

பங்கேற்பாளர்/ பாதுகாவலர் கையொப்பம் தேதி:

ஆய்வாளர் கையொப்பம் தேதி:

ஆய்வின் தகவல் தாள்

ஆய்வின் தலைப்பு

ராஜீவ் காந்தி அரசு பொது மருத்துவமனையில் இன்சிசனல் ஹெர்னியா (முந்தைய அறுவை சிகிச்சையினால் ஏற்படும் குடலிறக்கம்) நோய்க்கான காரணிகளையும் அதற்கு அளிக்கப்படும் பல்வேறு அறுவை சிகிச்சை முறைகள் பற்றிய ஆய்வு

ஆய்வாளர் பெயர்	:	**மரு.அ.அருள்குமார்**
ஆய்வு நிலையம்	:	**பொது அறுவை சிகிச்சைத்துறை, ராஜீவ் காந்தி அரசு பொது மருத்துவமனை, சென்னை மருத்துவக் கல்லூரி சென்னை – 3.**
பங்கேற்பாளர் பெயர்	:	

இந்த ஆராய்ச்சி/ ஆய்வு/ செய்முறையில் நீங்கள் பங்கேற்க நாங்கள் விரும்புகிறோம். இதிலுள்ள தகவலின் அடிப்படையில் இந்த ஆய்வில் பங்கேற்பதா அல்லது வேண்டாமா என்று நீங்கள் முடிவு செய்துகொள்ளலாம். உங்களது சந்தேகங்களை எங்களிடம் கேட்டு நிவர்த்தி செய்துகொள்ளலாம்.

இந்த ஆய்வின் நோக்கம்

முந்தைய அறுவை சிகிச்சையினால் ஏற்படும் குடலிறக்கம் நோய்க்கு கீழ்கண்ட அடிப்படையில் ஆய்வு செய்யப்படும்.

1. நோய்க்கான காரணிகள்
2. அதற்கு அளிக்கப்படும் பல்வேறு அறுவை சிகிச்சை முறைகள்
    - Onlay Mesh Repair (தசையின் மேல் வலை வைக்கும் முறை)
    - Preperitoneal Mesh Repair (வயிற்று முன் படலத்தின் மேல் வலை வைக்கும் முறை)
    - Laparoscopic Mesh Repair (நுண்துளை மூலம் வயிற்றின் முன் படலத்தில் வலை வைக்கும் முறை)
3. அறுவை சிகிச்சைக்குப்பின் ஏற்படும் பக்கவிளைவுகள்

ஆய்வின் செயல்முறை

விரிவான நோய் குறிப்புகளும் மருத்துவ பரிசோதனைகளும் செய்யப்பட்டு நோயாளிகளின் சம்மதம் பெற்று அவர்களுக்கு தேவையான அறுவை சிகிச்சை செய்யப்பட்டு அதன் பலாபலன் மற்றும் பக்கவிளைவுகள் ஆராயப்படும்.

ஆய்வினால் ஏற்படும் நன்மைகள்

இந்த ஆய்வின் முடிவில் கிடைக்கும் தகவல்கள் சமுதாயத்திற்கு பயனுள்ளதாகவும், எதிர்காலத்தில் நோயாளிகளுக்கு மருததுவத் தீர்வாகவும் அமையும்.

தங்களிடமிருந்து பெறப்படும் தகவலின் நம்பிக்கைத் தன்மை

தங்களிடமிருந்து பெறப்படும் தகவல்கள் பாதுகாக்கப்படுவதற்கான முழு உரிமையும் தங்களுக்கு உண்டு.

இந்தப் படிவத்தில் கையொப்பமிடுவதன் மூலம் தாங்கள் தங்களைப்பற்றிய விவரங்களையும், ஆய்வு விவரங்களையும் ஆராய்ச்சியாளர், ஆய்வு நடத்தும் ஏனையோர் வரைமுறை ஒழுங்கு குழுவினர் மற்றும் சட்டத்திற்கு உட்பட்ட மருந்து கட்டுப்பாடு இயக்குநர் ஆகியோர் பார்வையிட அனுமதிக்கின்றீர்கள்.

இந்த ஆய்வில் காட்டப்படும் தகவல்கள் அறிவியல் நாளேடுகளிலோ, அறிவியல் கூட்டங்களிலோ சமர்ப்பிக்கப்படும் பட்சத்தில் தங்களது அடையாளம் வெளிப்படுத்த மாட்டாது.

இந்த ஆய்வில் பங்கேற்காமல் இருப்பதினால் ஏற்படும் பாதிப்பு

இந்த ஆய்வில் தாங்கள் பங்கேற்க விருப்பம் தெரிவிக்காத நிலையில் தங்களின் மருத்துவ மற்றும் மருத்துவமனையில் தங்களுக்கு உள்ள உறவில் எந்த பாதிப்பும் ஏற்படாது. தாங்கள் சிறப்பாக கவனிக்கப்படுவீர்கள். மேலும் இதனால் தங்களுக்கு இழப்பு எதுவுமே ஏற்படாது.

ஆய்வின் நடுவில் அதிலிருந்து விலகிக்கொள்ள நினைத்தால்

இந்த ஆய்வில் பங்கேற்பது தங்களின் சொந்த விருப்பமே. மேலும் ஆய்வின் நடுவில் எந்த நேரத்திலும், எக்காரணமும் கூறாமல் விலகிக்கொள்ள தங்களுக்கு முழு உரிமையும் உண்டு. இருப்பினும் ஆய்விலிருந்து விலகுவதற்கு முன் ஆராய்ச்சிக்குழுவுடன் கலந்து ஆலோசிப்பது உகந்தது என பரிந்துரைக்கப்படுகிறது.

ஆய்வாளர் கையொப்பம்

நாள் :

பங்கேற்பாளர் கையொப்பம்

நாள் :

								PREVIOUS SURGERY		TYPE OF SURGERY PERFORMED					POST OP STATUS					
S.NO	R.NO	NAME	AGE	SEX	IP.NO	OBESITY (BMI>30)	DM	EMERGENCY/ELECTIVE	PROCEDURE	TYPE OF INCISION	ONLAY	PPMR	LAP IPM	SEROMA	WOUND INFECTION	DRAINAGE TIME (DAYS)	CHRONIC PAIN	LENGTH OF HOSPITAL STAY	RECURRENCE (3 MONTHS)	REMARKS
1	37	SHALINI	28	F	91270	N	N	EL	PS	SPT			LAP IPM	N	N	NIL	N	4		
2	27	DEVIKA	30	F	64783	N	N	EM	LSCS	LOWER MIDLINE		PPMR		N	N	3	N	6		
3	17	UMA	27	F	34895	N	N	EL	PS	SPT	ONLAY			N	N	6	N	8		
4	40	SHANTHI	45	F	105626	N	N	EM	LSCS	LOWER MIDLINE			LAP IPM	N	N	NIL	Y	7		
5	36	BAKKIYAM	45	F	58400	N	N	EL	PS	SPT			LAP IPM	N	N	NIL	N	5		
6	9	KAVITHA	48	F	45688	N	Y	EL	HYSTERECTOMY	LOWER MIDLINE	ONLAY			Y	Y	7	Y	21	YES	
7	30	PALANI	45	M	84134	N	N	EM	APPENDICECTOMY	LOWER MIDLINE		PPMR		N	N	4	N	8		
8	50	KALANJI	50	F	81906	N	N	EL	HYSTERECTOMY	LOWER MIDLINE			LAP IPM	N	N	NIL	N	4		
9	19	KASTHURI	44	F	6042	N	N	EM	LSCS	LOWER MIDLINE		PPMR		N	N	5	N	8		
10	26	LAKSHMI	37	F	62192	N	N	EM	LSCS	PFANNENSTIEL		PPMR		N	N	4	N	7		
11	1	ROSY	42	F	56845	N	N	EM	LSCS	PFANNENSTIEL	ONLAY			N	N	7	Y	10		
12	34	CHANDRA	60	F	28520	N	Y	EL	HYSTERECTOMY	LOWER MIDLINE		PPMR		Y	Y	5	Y	10		
13	10	HAJINA BEGUM	40	F	74333	N	N	EM	LSCS	PFANNENSTIEL	ONLAY			N	N	5	N	9		
14	35	RAJ	43	M	132752	N	N	EM	D1 PERFORATION CLOS	UPPER MIDLINE			LAP IPM	N	N	NIL	N	3		
15	21	LATHA	40	F	51806	N	N	EM	LSCS	PFANNENSTIEL		PPMR		N	N	5	N	8		
16	8	RATHI	44	F	53492	N	N	EM	LSCS	LOWER MIDLINE	ONLAY			N	N	6	N	8		
17	14	GANGADEVI	25	F	6711	N	N	EM	APPENDICECTOMY	GRIDIRON	ONLAY			N	N	5	N	7		
18	45	MUNIYAMMAL	36	F	62422	N	N	EM	LSCS	PFANNENSTIEL			LAP IPM	N	N	NIL	N	6		
19	15	MALLIGA	45	F	9989	N	N	EM	LSCS	LOWER MIDLINE	ONLAY			N	N	6	N	8		
20	20	JAYAMMAL	60	F	96782	N	N	EL	HYSTERECTOMY	LOWER MIDLINE		PPMR		N	N	4	N	5		
21	6	SAROJA	55	F	10022	N	N	EM	LSCS	LOWER MIDLINE	ONLAY			N	N	4	N	7		
22	22	HEMAVATHI	45	F	53661	N	Y	EM	D1 PERFORATION CLOS	UPPER MIDLINE		PPMR		Y	N	7	Y	10		
23	41	ANBARASI	45	F	2479	N	Y	EL	HYSTERECTOMY	LOWER MIDLINE			LAP IPM	Y	N	NIL	N	7		
24	16	SARASWATHI	43	F	29623	N	Y	EM	LSCS	PFANNENSTIEL	ONLAY			Y	Y	7	Y	10		
25	44	THULASI	28	F	50303	N	N	EL	PS	SPT			LAP IPM	N	N	NIL	N	5		
26	25	RAJ	35	M	65112	N	N	EM	APPENDICECTOMY	GRIDIRON		PPMR		N	N	4	N	7		
27	28	LATHA	43	F	66940	N	N	EM	LSCS	PFANNENSTIEL		PPMR		N	N	4	N	7		
28	3	GLORY	42	F	66569	N	Y	EM	RESECTION & ANASTAM	MIDLINE	ONLAY			Y	N	6	N	14		
29	29	MURUGAMMAL	55	F	76447	N	Y	EL	HYSTERECTOMY	LOWER MIDLINE		PPMR		Y	N	5	N	9		
30	39	VEERAMMAL	45	F	92901	N	N	EM	LSCS	LOWER MIDLINE			LAP IPM	N	N	NIL	N	5		
31	11	MOHANA	54	F	77585	N	N	EL	HYSTERECTOMY	LOWER MIDLINE	ONLAY			N	N	5	N	7		
32	48	LAKSHMI	35	F	117177	N	N	EL	LSCS	LOWER MIDLINE			LAP IPM	N	N	NIL	N	4		
33	43	VIMALA	42	F	42232	N	N	EM	LSCS	LOWER MIDLINE			LAP IPM	Y	N	NIL	Y	8		
34	31	JEYALAKSHMI	42	F	79219	N	N	EL	LSCS	LOWER MIDLINE		PPMR		N	N	3	N	5		
35	7	ATHILAKSHMI	40	F	11167	N	N	EL	OVARIAN CYSTECTOMY	LOWER MIDLINE	ONLAY			Y	Y	7	Y	10		
36	18	MANJULA	38	F	43200	N	N	EM	LSCS	LOWER MIDLINE	ONLAY			N	N	5	N	8		
37	24	BHARATHY	25	F	56640	N	N	EL	PS	SPT		PPMR		N	N	3	N	6		
38	13	DHAYALAN	50	M	72950	N	N	EM	D1 PERFORATION CLOS	UPPER MIDLINE	ONLAY			Y	Y	7	N	10		
39	38	PRADEEPA	29	F	92891	N	N	EM	LSCS	PFANNENSTIEL			LAP IPM	N	N	NIL	N	4		
40	4	VADIVEL	61	M	71892	N	Y	EL	CHOLECYSTECTOMY	KOCHER'S SUBCOSTAL	ONLAY			N	N	5	N	8		
41	42	SAMPANKI	30	F	6089	N	N	EM	LSCS	PFANNENSTIEL			LAP IPM	N	N	NIL	N	5		
42	47	SRINIVASAN	45	M	117434	N	N	EM	D1 PERFORATION CLOS	UPPER MIDLINE			LAP IPM	N	N	NIL	N	4		
43	33	USHA	24	F	70340	N	N	EL	LSCS	LOWER MIDLINE		PPMR		N	N	4	N	7		
44	12	RAGUPATHY	43	M	82690	N	N	EM	APPENDICECTOMY	GRIDIRON	ONLAY			N	N	5	N	7		

45	5	RADHIKA	38	F	86566	N	N	EL	PS	SPT	ONLAY			N	N	5	N	7
46	46	VIJAYA	31	F	61325	N	N	EM	D1 PERFORATION CLOS	UPPER MIDLINE			LAP IPM	N	N	NIL	N	5
47	23	RATHIMEENA	46	F	51494	N	N	EM	LSCS	LOWER MIDLINE		PPMR		N	N	4	N	7
48	49	DHANALAKSHMI	45	F	90825	N	N	EM	LSCS	PFANNENSTIEL			LAP IPM	N	N	NIL	N	3
49	32	SHENBAGAM	32	F	66818	N	N	EM	LSCS	PFANNENSTIEL		PPMR		N	N	4	N	8
50	2	AMUTHA	60	F	56699	N	Y	EL	HYSTERECTOMY	LOWER MIDLINE	ONLAY			Y	N	8	N	14